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The Magazine of the Arnold Arboretum

AUG 09 2000

GRAY HERBARIUM





Delicatissimum (1891)



Purpureum Grandiflorum (1886)



Rhododendron catawbiense



Album Elegans (1891)



Mrs. Charles S. Sargent (1917)

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Front cover: *Rhododendron* 'Big Deal' photographed by Dick Brooks.

Inside covers: Watercolor drawings of petals from "ironclad" hybrid rhododendrons and their common parent, *Rhododendron catawbiense*. The hybrids are among the oldest rhododendrons in the Arboretum (year planted is in parenthesis), all were imported from England. Painted by C. H. L. Gebfert as a guide to identification by color, 1931. Archives of the Arnold Arboretum.

Back cover: Hand-colored photograph of rhododendrons at 'Wellesley', where H. H. Hunnewell conducted many of the early hardiness trials. Archives of the Arnold Arboretum.

Mary Gibson Henry, Plantswoman Extraordinaire

Mary Harrison

In the eighteenth century the amateur was a familiar breed of botanist, especially in Colonial America. John Bartram, who was to become the king's botanist in 1765, learned his art through experience in the field and by corresponding with horticulturists and botanists on both sides of the Atlantic. Jane Colden, sometimes referred to as America's first woman botanist, learned from her father and the books he procured for her, and through correspondence with botanists who admired her ability to recognize unusual species around her home in New York State. In the twentieth century the tradition continued and was represented especially well by Mary Gibson Henry.

Mary Henry was born in 1884 at her grandparents' house near Jenkinstown, Pennsylvania, to Susan Worrell Pepper and John Howard Gibson. Her mother's family were Quakers who had come from England with William Penn and taken part in the founding of Philadelphia. Horticulture was a traditional pursuit on both sides of the family. George Pepper, a great-grandfather, had been a member of the first Council of the Pennsylvania Horticultural Society in 1828, and her Gibson grandfather, a keen plantsman, had his own greenhouse. Her father enjoyed hunting and camping, and contributed to her interest in the natural world.

The home of Mary's family was in the center of Philadelphia and had no garden, but before her father's death in 1894, the family often visited Moosehead Lake in Maine. There, under her father's influence, her familiarity with the countryside developed. She became especially interested in native plants, and her first acquaintanceship with twin-

Mary Gibson Henry (second from left) photographed in the ballroom of her grandparents' house, 'Maybrook', in Wynnwood, Pennsylvania. To her left is her daughter Josephine deNemours Henry, and at her right is her aunt Mary Klett Gibson. At the far right is her daughter Mary Gibson Henry Davis.





ALL PHOTOS, COURTESY OF THE HENRY FOUNDATION FOR BOTANICAL RESEARCH

flower (*Linnaea borealis*), a dwarf evergreen shrub, awakened in her "not only a love for and appreciation of the absolute perfection of the flower itself, but also for the dark, silent forest that shelters such treasures." Many years later (1932) she came upon this plant again, in northern British Columbia, growing "in damp, shady woods, in lower altitudes and on bare, bleak, stony mountain tops up to 6000 feet."

Mary attended the Agnes Irwin School in Philadelphia for six years; when she left in 1902, her formal education ended. In the years following school she visited the Grand Canyon and the Colorado Rockies, and on a trip to Europe she climbed Mont Blanc with her brother and several guides.

In 1909 she married John Norman Henry, a physician who later became Philadelphia's director of public health as well as president of the General Alumni Society of the University of Pennsylvania. The couple first lived in Philadelphia where Mrs. Henry had "a nice backyard . . . and a tiny greenhouse." In 1915 they acquired a large farm in Maryland with a view to building a home there. The plan was abandoned when World War I interfered and Dr. Henry volunteered for duty overseas. Nevertheless, long summers spent in existing bungalows on the property allowed Mrs. Henry to develop a large kitchen garden, acquire some exotic ornamentals, and experiment with native rock plants. In addition to gardening in Maryland, she cultivated orchids in the Philadelphia greenhouse, and in 1924 she published an essay on the subject in *Garden Magazine*. She read widely in horticulture and botany, and it was her reading during this period that first developed her interest in wild plants of the southeastern United States. Two books were of special significance to her, *Manual of the Southeastern Flora* by J. K. Small and *The Travels of William Bartram*, which she found an "unending source of inspiration."

Time to indulge horticultural interests was limited, however, for Mrs. Henry quickly became the mother of five children, the youngest of whom died at the age of six. Although basically confined to home during the twenties, she continued to expand her knowledge about plants by studying nursery catalogs, often from

distant places—*Trees and Shrubs* from a nursery in Tunbridge Wells, England; *Coolidge Rare Plant Gardens* (1923) from a California nursery; *Himalayan and Indigenous Plants, Bulbs, Seeds* (1927) from a nursery in Bengal, India. Seed lists came from the U.S. Department of Agriculture's Office of Foreign Plant Introductions, and from the Royal Botanic Garden, Edinburgh, which she had visited in 1923. (Following that visit Mrs. Henry initiated a correspondence with the R.B.G.'s Regius Keeper, William Wright-Smith, that lasted until he died in 1956. Indeed, Wright-Smith was among the earliest of several mentors to whom she looked for professional advice.)

In 1926 the Henrys bought Gladwyne, a run-down farm of ninety hilly acres twelve miles from the center of Philadelphia, where they hoped to combine the functions of their Philadelphia and Maryland homes. As the Henrys' architect described it, a greenhouse was built with a house attached. Planting must have begun immediately, for a 1928 inventory of the Gladwyne garden records over 200 shrubs and plants, with multiple varieties of several species—seven *Cornus florida* and three *Hamelis vernalis*, for example. Mrs. Henry's interest in diversity within a single species was later reflected in her passion for collecting and hybridizing and an unflagging pursuit of particular colors and dimensions. By 1931 there were some 850 trees and shrubs in her garden, some of them new Asiatic finds acquired from the collectors Forrest, Wilson, Rock, Farrer, and Ward.

Another of Mrs. Henry's early mentors was Francis Pennell, curator of botany at the Academy of Natural Sciences in Philadelphia, from whom she sought help with identification. When she expressed an interest in collecting wild plants for her garden, it was he who urged her to collect herbarium specimens along with the plants and schooled her in how to document her finds.

In part, Mrs. Henry attributed her desire to collect to William Bartram. His glowing description of *Rhododendron speciosum flammeum* (now *R. speciosum*) had fired her desire to acquire a specimen, and when her search in commercial outlets and botanical gardens



One of the showiest of native American azaleas, *Rhododendron speciosum* (now *R. flammeum*), the Oconee azalea. Mrs. Henry's repeated journeys in search of this plant resulted in seven color variants. Its range is confined to USDA zones 6 and 7.

proved unsuccessful, she decided to seek it in the wild. This was the impetus for a long life of annual and sometime biannual collecting trips that continued until her death in 1967.

Her sympathetic husband encouraged her to fulfill her ambitions and was able to equip her handsomely with the tools and transport needed for her expeditions. A car (specifically, a Lincoln Continental), "outfitted with an 'attic,' an electrically lit desk and a bookcase" was designed. "The rear compartment is insulated and ventilated so that newly collected plants can travel comfortably. Three plant presses, numerous buckets, spades etc. are part of the equipment." This unusual vehicle was driven by a chauffeur, Ernest Perks, who remained with the Henrys for sixty-five years. On some of her journeys Mrs.

Henry was also accompanied by her daughter Josephine, a skilled photographer who took color photographs of plants later used by Mrs. Henry in her lectures.

On her first trip to the Southeast she covered 2,000 miles and on that and later trips collected seven color variations of *Rhododendron speciosum*. Later expeditions were made along the Atlantic Coastal Plain, on the Piedmont Plateau, in Appalachia, and in the mountains of east Tennessee and Alabama. Mrs. Henry planted her finds at Gladwyne and sent herbarium specimens to the Academy of Natural History in Philadelphia and the Royal Botanic Garden, Edinburgh.

Experience quickly taught her that "rare and beautiful plants can be found in places that are difficult of access. . . . Often one has to shove one's self through or wriggle under briars, with awkward results to clothing . . . Wading usually bare legged through countless rattlesnake infested swamps adds immensely to the interest of the day's work . . . On several occasions I have been so deeply mired I had to be pulled out." She also learned that the habitats of many of the plants she sought were in urgent need of protection. In the Southeast she found the swamp

habitats of wild lilies being used as waterholes for cattle or as dumps. To encourage the growth of grass for grazing, farmers often burned brush, destroying wild azaleas at the same time. These threats reinforced her determination to collect and cultivate American natives and to eventually introduce them to American gardens.

During a family holiday to Canada's Jasper National Park in 1930, the Henry family learned of a "tropical valley" in northern British Columbia that was reportedly frost-free in spite of the extreme winter temperatures surrounding it. Their curiosity aroused, the family decided to explore the area; for Mrs. Henry the opportunity to collect in completely new territory in terrain ranging from 2,550 to 9,000 feet was an irresistible challenge.



Mary Gibson Henry and members of her family at the outset of their expedition to British Columbia in 1930.

The Canadian Department of the Interior had little information on the area. Mrs. Henry summarized it later, "Waterfalls and rapids in the rivers make traveling by water impossible, while the distance by land is great over wide stretches of bog and mountainous country still in its virgin roughness, and much of it yet unmapped." However, an old schoolfriend of Dr. Henry, then head of the Canadian National Railways, gave them helpful advice, and the Canadian government sent along a topographer, K. F. McCusker, to map the territory as they explored. Since the Henry family included two sons and two daughters ranging in age from 14 to 21 and their travels would take them to remote areas, they also arranged for a physician to accompany them.

The party left Philadelphia by train on June 25, 1931, arriving at Pouce Coupé, in northern British Columbia, on June 30. From there they motored to Fort St. John, where they joined the 9 men, 58 horses, and all the supplies that

would accompany them. For the next eighty days, they traveled fifteen to twenty miles a day on horseback with occasional stops to collect plants, seeds, and herbarium specimens. The journey led them alongside rivers and through meadows filled with Jacob's ladder (*Polemonium*), larkspur (*Delphinium*), and penstemons. In the higher country bellflower (*Campanula*) and forget-me-not (*Myosotis*) were abundant. "Collecting plants while riding with a pack is not always a simple matter. A trowel goes in a leather sheath on one side of my belt and a knife on the other side. A strong pair of saddle bags is fastened to the pommel on my saddle, in which each morning are placed several empty jam cans. Each evening all full cans are aired and watered, and in the morning are all carefully packed in wooden packing cases on the horses. Quite frequently the cans were frozen solid to the ground and I had to use my ax to chop them loose." Mrs. Henry's collecting methods proved reasonably successful, and

Tropical Valleys in the Far Northwest

Reports such as those heard by the Henrys of "tropical" valleys in Canada's far northwest were frequent at the time. The heating agent was the many sulphur springs in those valleys. In the 1920s their warmth enabled a trapper working out of Fort Laird, within seven degrees of the Arctic Circle, to grow winter crops of potatoes, onions, and tobacco.

The area the Henrys were interested in exploring lies between the Peace and Liard rivers, roughly 56° north latitude & 121° west longitude and 58° north latitude & 123° west longitude. The first Europeans had made their way through the northern Rocky Mountains by way of the Peace River some 150 years previously, but few botanical collectors had been there. In 1872, the Canadian botanist John Macoun, working for the Canadian Pacific Railway, collected in the vicinity of Fort St. John (established about 1805) and Hudson Hope (established in 1808). He also collected for the Canadian Geological Survey, which carried out a scientific investigation of the Peace River in 1875. Further surveys by others had been made in 1887 and 1891, resulting in some knowledge of the distribution of certain trees and shrubs.

In response to the Henrys' discussions with the Canadian Department of the Interior, one of their topographers, K. F. McCusker, was assigned to accompany the group and to map the territory. The expedition began on 25 June 1931, covered a thousand miles on foot and horseback, and lasted eighty days. Near sulphur springs, Mary

Henry noted "rank growth of delphinium often over eight feet tall and raspberries, roses and vetches growing in the thickest, most luxuriant tangle." A pool nine feet in diameter with crystal clear water and temperatures estimated at about ninety degrees Fahrenheit provided an "Arctic Tub" enjoyed by the group.

McCusker gave Henry family names to many of the rivers, lakes, and mountains they encountered. One mountain at 9,000 feet "stands forth pre-eminently, its snow-covered summit towering above the others, the highest mountain we saw all summer." This McCusker named for Mary Henry and subsequently British Columbia's Department of Lands made the name official.

In the following year Hugh Raup, then an associate researcher at the Arnold Arboretum, made an Arboretum-sponsored collecting trip to the same territory. He described his experience and catalogued his and Mary Henry's collections in *Phytogeographic Studies in the Peace and Upper Liard River Regions, Canada*. He included a brief account of the Henry expedition and noted that Mrs. Henry "collected 350 numbers of flowering plants and ferns, making notable additions to the known flora of the region."

On a lecture tour of England and Scotland in 1948, Mrs. Henry presented an account of her travels to the Royal Horticultural Society and to the Royal Scottish Geographical Society, which awarded her the Mungo Park Medal for Exploration in Northern British Columbia.

many of the plants survived the journey back to Philadelphia. *Opuntia frigida*, *Monarda mollis* var. *menthaefolia*, *Artemisia frigida*, *Amelanchier florida*, and *Cornus stolonifera* survived at Gladwyne for some years, but many of the northerners were unable to adjust to the local climate.

Mrs. Henry considered the most interesting find of the expedition to be Lapland rosebay

(*Rhododendron lapponicum*), collected near St. Paul's lake in northern British Columbia. She sent a specimen for identification to Alfred Rehder, the curator of the herbarium at the Arnold Arboretum, who reported that it was previously known in North America only in the East northward of the higher mountains of northern New York and New England. He declared it "an extremely interesting discovery . . . its occur-

rence in Western North America is of great phytogeographical interest . . . I have placed a small twig of it on record in our herbarium . . . for neither we nor the Gray herbarium had any specimens of this species from the West."

Herbarium specimens were also distributed to the Academy of Natural Sciences of Philadelphia and the Royal Botanical Garden, Edinburgh, and a few woody plants came to the Arnold Arboretum. The Royal Botanical Garden, Edinburgh, also received seventy packages of seed, and fifty cans of living plants went to Gladwyne.

Mrs. Henry traveled back to the Peace River area in 1932, 1933, and 1935 with her daughter, Josephine, and K. F. McCusker, the topographer. They communicated with Philadelphia via twelve carrier pigeons they brought with them and received messages from Dr. Henry by radio receiver.

Following these trips to British Columbia Mrs. Henry continued collecting in the southeastern part of the United States. Nothing could surpass her delight in the northlands, but comparatively few plants from there were able to survive the hot summers in Philadelphia, whereas plants from the Southeast flourished there. "As a field botanist," she wrote, "duty calls me to those fertile fields of our southern states where so many treasures lurk in out of the way corners."

From 1931 to 1935 Mrs. Henry wrote six parts of her account of the Peace River expedition, *Collecting Plants Beyond the Frontier*, published by *National Horticulture Magazine*; two final segments appeared in the same journal in 1949. During this period she also wrote twenty-three other articles, most of them published in *Horticulture* or in *National Horticulture Magazine*. Her topics included uncommon oaks and rare rhododendrons, little known violets and unusual honeysuckles, hybrid jasmines and Indian begonias. Based on her own personal experience, she evaluated plants for cold hardiness and recommended soil mixtures, transplanting methods, and greenhouse techniques.

Following her husband's death in 1938, Mrs. Henry turned her attention to expanding her garden. At the summit of the land at Gladwyne was a huge deposit of Baltimore gneiss around

which she developed a naturalistic rock garden. The plantings included native American alpine plants, some of them collected in northern British Columbia; many varieties of phlox, silene, and artemesia; hymenocallis from Georgia and Florida; tradescantia from the Gulf of Mexico; gentiana from New Jersey; and yuccas from eighteen different locations; calycanthus and low-growing magnolias from Georgia; and many varieties of dwarf rhododendrons. A trillium garden was planted in a woody area near a small stream, and collections from Texas, New Mexico, and Arizona were established in a desert rock garden. Each plant was provided with a soil mixture and habitat as similar as



Hymenocallis henryae. Mrs. Henry found this new species in western Florida; botanist Hamilton Traub described and named it. Mrs. Henry collected species of *Hymenocallis* from eleven southern states. Some were planted outside and lifted for the winter. At one time she had 125 varieties of lily. "distinct, beautiful variants of eastern American lilies." As she herself noted, lilies "engaged much of my time."



"As for my rock garden, the largest of the existing pile of rocks were too big to move and all I did was to rearrange the smaller ones and to make paths and steps that are scarcely distinguishable. Soils were changed into suitable mixtures" (1943). Mrs. Henry gives scale.

possible to its original growing conditions; the change in latitude often resulted in plants remaining desirably small and compact.

Visitors to Gladwyne often commented on the range of plants growing there. E. H. Wilson, in identifying *Quercus pumila*, which Mrs. Henry had sent him, expressed surprise that this southeastern plant should prove hardy in Philadelphia; and William Judd, Arnold Arboretum propagator and one of Mrs. Henry's advisors, was impressed by the many rare and unusual plants that could not be found elsewhere so far north.

At the end of the 1930s Mrs. Henry began to receive recognition for her achievements. She became a director of the American Horticultural Society and a council member of the Pennsylva-

nia Horticultural Society. When the Rock Garden Society inaugurated their bulletin in 1943, she was appointed associate editor and wrote the first article in volume one, number one, "A Rock Garden of Natives." In 1941 she became a research associate in the department of botany at the Academy of Natural Sciences, Philadelphia. That same year the Pennsylvania Horticultural Society awarded her their Schaeffer Gold Medal for her "notable contribution to horticulture. Her keen eye has detected many species and varieties of horticultural value. These have been transplanted to or propagated in her garden at Gladwyne and her skill in their culture has made possible the demonstration that many highly attractive native plants can be grown far from their native haunts . . . As a result of her untiring efforts we are now more



Phlox x henryae, a cross of *P. nivalis* and *P. bifida*, originated at Gladwyne, "a chance seedling in my trial garden." *P x henryae*, a pale pink with deeply notched lobes, is in the foreground with *P. bifida* in the rear.

than ever aware of the tremendous potentialities of the native American flora for supplying plants worthy of cultivation."

It was at this time that Mrs. Henry began to make her plants available to nurseries. The Upper Banks Nursery, operated by Fairman Furness, was a fifty-acre garden and rare plant nursery along Ridley Creek in Media, Pennsylvania. In 1940 Mrs Henry gave Furness permission to gather cuttings of many of the plants in her garden. When the plants were ready for distribution in 1942, he published a catalog, *Rare and Native Shrubs Collected by Mary Henry*, that included varieties of *Rhododendron*, *Calycanthus*, *Halesia*, *Philadelphus*, and *Syringa* that she had developed. The Mayfair Nurseries, rock garden specialists in Hillsdale, New Jersey, also offered plants from Gladwyne,

including many varieties of Mrs. Henry's phlox and penstemon.

Over the years her interest in collecting and breeding lilies had grown. In 1946 she was awarded the silver medal at a lily show organized by the Massachusetts Horticultural Society. "The most outstanding exhibit of lilies from the American wilds was the eight selections of *Lilium philadelphicum* now being cultured by Mrs. Henry at Gladwyne, Pennsylvania," wrote the judges.

Perhaps the most satisfying achievement in her work with lilies was the discovery of a fragrant, yellow specimen in a cattle pasture in southern Alabama, near the Gulf of Mexico. "I had long hoped," she confessed, "that I might chance upon some species which had remained unknown to science." In addition to herbarium specimens she collected seeds, which were successfully propagated at Gladwyne and bloomed after five years. The species did prove to be a new discovery; Mrs. Henry named it *Lilium iridollae*, for it represented to her "the pot of gold at the foot of my rainbow."

In 1949 Mrs. Henry's garden was threatened with destruction when the State of Pennsylvania and the U.S.

Army Engineers decided to use Gladwyne "as a dump for the silt, sewage and refuse to be pumped from the bottom of the Schuylkill River." She called upon her many botanist friends and colleagues around the United States and in Great Britain to support her appeal to the governor of Pennsylvania to spare the property. Not only was the appeal successful, but the letters her supporters wrote provide clear evidence of Mrs. Henry's status in the horticultural world. All spoke of the importance of her collection of native and rare American plants and of its great scientific and horticultural value. Some put the garden in the same class as the Royal Botanic Gardens at Kew and the Arnold Arboretum. Mrs. Henry was described as a highly competent botanist and an extremely skilled horticulturist. The president of the

Royal Horticultural Society pointed out that her fine American flora, "much superior to the ordinary run," were being distributed to gardens in England. Hugh Raup, professor of botany at the Harvard Forest, wrote, "She has been an indefatigable student of horticultural values in the native American flora, in the finest tradition."

To safeguard the garden's future, Mrs. Henry established the Henry Foundation for Botanical Research, dedicated "to the collection and preservation of choice, rare and endangered New World Plants."

A year or so before her death Mrs. Henry was advised by her physician to reduce the strenuous level of her activities. She nevertheless continued to lead a full life as outlined in the 1966 publication *Accomplishments of the Foundation*, which recounts her activities during the

last full year of her life. Between May and August she spent 42 days in the field, traveling in Delaware, Maryland, Virginia, West Virginia, Kentucky, North Carolina, and Florida, and collecting some 75 plants, including another *Lillium iridollae* and a *Styrax americanum* that still grows at Gladwyne. That same year she filled orders from retail nurseries all over the United States and from individuals from Peru to Israel. She distributed Gladwyne material to the Morris Arboretum, the University of Arkansas, the Royal Botanic Garden, Edinburgh, Hilliers Nursery in England, and the Agricultural Experimental Station in Puerto Rico. Visitors to her garden included members of the American Rhododendron Society, the U.S. Department of Agriculture, the New York Botanical Garden, the Royal Botanic Garden, Edinburgh, and the department of botany at Princeton University.



Mrs. Henry wrote in her autobiography, "Winters have found me enmeshed deeply in the routine work of my tiny greenhouse and six coldframes . . . about 600 pots and flats to be repotted and taken care of and that duty devolves entirely on me. Most of the pots contain Amaryllids and what began as 'winter fun' has turned into a serious breeding program."



Lilium iridollae (the pot-of-gold lily) was perhaps the most cherished of Mrs. Henry's many finds. She collected the original specimen and seeds in southern Alabama, 1940. A single-flowering plant of three to five feet in height, her seedlings first flowered in 1945.

On a collecting trip in North Carolina in April 1967, Mary Gibson Henry died at the age of eighty-two. Her years of devotion to horticulture had produced many solid achievements: over a hundred articles had been published in journals such as *Herbertia*, *Bartonia*, and *National Horticultural Magazine*; herbaria in Scotland and North America had received thousands of specimen sheets from her collections; the hardness of plants previously thought too tender for Philadelphia had been demonstrated; new species and varieties had been introduced to arboreta and nurseries; interest in American flora for American gardens had been stimulated; the garden at Gladwyne had been preserved for future generations.

Following her mother's death in 1967, Josephine deN. Henry became director of the Foundation, a position she held until 1996, when she was succeeded by Mrs. Henry's granddaughter Susan Treadway. These successors have continued to expand the collection of native American plants and to maintain the natural qualities of the garden. Through lectures, plant sales, and garden tours, new generations are introduced to the work and ideals of the garden's founder.

References

- Archives of the Henry Foundation for Botanical Research, Gladwyne, Pennsylvania
 25 September 1943. William Henry Judd to Mary Gibson Henry.
 13 November 1931. Alfred Rehder to Mary Gibson Henry.
 27 November 1931. Ibid.
 19 December 1935. Ibid.
 29 November 1929. E.H. Wilson to Mary Gibson Henry.
- Henry, Josephine deN. 1980. Not All Plantsmen Are Men. *Bulletin of the American Rock Garden Society* 30(2): 68-73 & 30(3): 115-122.
- Henry, Mary Gibson. 1950. An Autobiography. *Herbertia* 6: 11-30.
- 1933. Exploring and Plant Collecting in Northern British Columbia. *Year Book of the Pennsylvania Horticultural Society*, 68-75.
- 1946. A New Lily from Southern Alabama and Northern Florida. *Bartonia: Journal of the Philadelphia Botanical Club* 24: 1-4.
- Raup, Hugh M. 1934. Phytogeographic Studies in the Peace and Upper Liard River Regions, Canada. *Contributions from the Arnold Arboretum of Harvard University* VI.
- Stout, C. Frederick C. 1942. Report of the President. *Year Book of the Pennsylvania Horticultural Society*, 11.

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Note

To visit the Henry Foundation for Botanical Research, call 610-525-2037 or write to the Foundation at Box 7, Gladwyne, PA 19035, for reservations and information about membership, educational programs, plant sale, hours, fees, directions, and parking.

Mary Harrison is a volunteer in the Arboretum's herbarium and library. She has annotated the letters and diaries of William Judd, the letters of Oakes Ames, and indexed the minutes of the Horticultural Club of Boston. Her next undertaking will be the annotation of the diaries of plant explorer Joseph Rock.

Flowering Plants and Their Pollinators at the Arnold Arboretum

David Giblin

Many visitors to the Arnold Arboretum know it as a world-renowned garden with an unparalleled collection of woody plants. For others, it is a park affording respite from urban pressures. For still others, it is an important resource for studying a wide range of topics, from plant exploration to arboriculture, from plant taxonomy to the history of landscape design. Speaking for myself, as a floral biologist I view the Arboretum as one of the world's finest museums of pollination biology.

The plant collections of the Arnold Arboretum are living illustrations of the remarkable floral diversity engendered over evolutionary time by the participation of pollinators in plant reproduction. The variety of floral sizes, shapes, colors, and fragrances on display demonstrate the range of adaptations evolved by the flowering plants in response to the predilections and idiosyncrasies of their pollinators.

For example, some flowers in the collections are open to all potential pollinators; others have evolved complex morphologies that allow entry to only the most reliable visitors. Each morphology reflects a strategy that has proven successful in ensuring that these winged vectors transport pollen between flowers. Among the more astonishing strategies are the use of petal color and pattern as signals, both honest and deceptive, and of male floral parts that are spring-loaded or acoustically sensitive.

By definition pollination is the process whereby pollen grains (male gametes) are depos-



*The flowers of magnolias are open to all, pollinators and nonpollinators alike. In this photograph of *Magnolia acuminata* var. *subcordata*, the visitor, a bee, happens to be a pollinator, but it could just as well be a beetle or fly enjoying a free meal.*

ited on the female reproductive structures of vascular seed plants, typically with the aid of animals, wind, or water. For pollination to result in fertilization, the sperm cell of a pollen grain must unite with the egg cell of an ovule, after which the fertilized ovule develops into a seed.

Basic biology teaches that the living vascular seed plants are divided into the gymnosperms (the conifers, cycads, gnetophytes, and ginkgo) and the angiosperms (flowering plants) on the basis of their reproductive characters. The primary distinction is that gymnosperms (literally, "naked seeds") lack flowers—the ovules are borne openly in cones—whereas in angiosperms ("vessel-seeds") the ovules are enclosed within the carpel of the flower. The fossil record has shown that flowers evolved after the gymnosperms, making the latter the more ancestral lineage.

The course of floral evolution in angiosperms involved several major trends. These include a reduction in overall complexity (for instance, a reduced number of stamens or petals), a transition from radial to bilateral floral symmetry, the fusion of petal and/or sepal parts, and a transition from a superior ovary (that is, the ovary sits above the attachment of the other floral whorls) to an inferior one. It is important to remember that these are trends; evolution is not a linear process. Ancestral morphologies such as radially symmetrical flowers with separate petals and superior ovaries can be found in angiosperm families that are regarded as having originated more recently.

Most biologists agree that insects, probably beetles, were the first pollinators, and that gymnosperms were the first seed plants to rely on pollinators for reproduction (Leppik 1960). Gymnosperm taxa, including members of Cycadaceae and Gnetaceae (*Welwitschia mirabilis* and species of *Ephedra*), all show evidence of being insect-pollinated (Norstog 1987; Cooper-Driver 1994; Proctor and Yeo 1996). Presumably insects feed on the protein-rich pollen of the male cones and on a sticky, sugar-rich feature of the female cone that catches airborne

pollen grains. In the course of foraging among plants, the insects deposit pollen on the female cones, allowing fertilization to begin.

The evolutionary pathway from the gymnosperms to the angiosperms has not yet been completely mapped. We do know that gymnosperms are almost exclusively wind-pollinated, whereas the majority of angiosperms evolved a dependence on insects, birds, or mammals for pollination. Interestingly, recent systematics studies have shown that speciation in plants has been greater in those lineages that are animal-pollinated (Dodd et al. 1999). Those studies support the theory that diffuse coevolution between angiosperms and their pollinators contributed to today's diversity of flowering plant species (Takhtajan 1991).

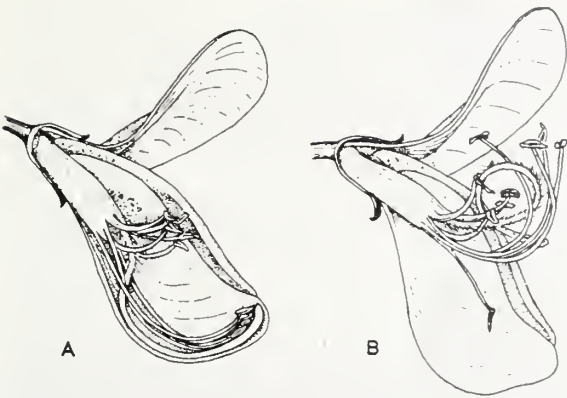
Diffuse coevolution occurs when two groups of organisms—in this case, flowering plants and pollinators—interact in such a way that evolutionary change in one group leads to evolutionary change in the other. Evidence for diffuse coevolution in the plant-pollinator relationship is suggested by the fossil record, which shows rapid diversification within both angiosperm and insect lineages between 75 and 50 million years ago (Proctor and Yeo 1996). For example,

the length of bee mouthparts increased during the time that tubular flowers arose; longer mouthparts presumably allowed access to nectar found at the base of many tubular-flowered species.

Nevertheless, pollination biologists dispute the degree of specialization in the coevolutionary association between plants and pollinators. Several leading researchers believe that the evolution of floral morphologies that attract specific pollinators are the exception. Their evidence is the observation that flowers of many plant species are visited often by a diversity of insect types (Waser et al. 1996). Opponents of this view argue that visitation does not always result in pollination, and it is



In the bilaterally symmetrical flowers of yellowwoods, the pistil and stamens are tightly enclosed within the petals, permitting access only to bees, which are both discriminating and reliable pollinators.



Prior to pollinator visitation, “spring-loaded” anthers are held by the lower petals. Pollinators disrupt the petals upon entry, releasing the anthers, which deposit their pollen on the insect’s underside. From *The Natural History of Pollination* by Michael Proctor, Peter Yeo, and Andrew Lack, 1996. Used by courtesy of Timber Press.

pollinator preference that has driven diversification in floral morphology.

The long-standing, coevolutionary association between plants and pollinators is based on a mutualism, a win-win situation for the participants of a biological interaction. In this case, plants benefit by getting their pollen transported between flowers, and pollinators benefit by acquiring pollen, nectar, or oils from the flowers that they visit.

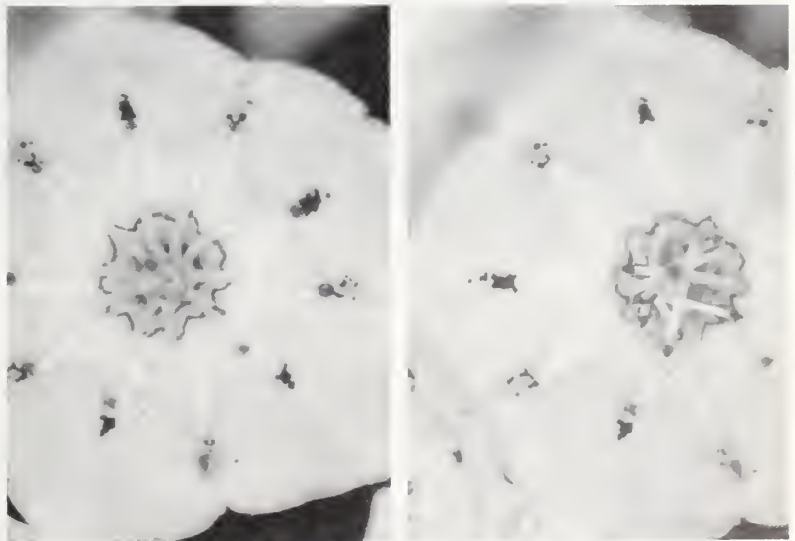
A mutualism often requires continual adjustments by the participants to ensure a parity in benefits. From the plant’s perspective, the number of fertilized ovules must be high enough to justify the investment in energy required to attract and reward pollinators. This investment can be measured in terms of flower size and number, duration of flowering period, and/or amounts of pollen, nectar, or oil produced. To ensure adequate return on this investment, plants typically do not provision each flower with rewards high enough to satisfy the pollinator’s needs in a single visit. The goal is to offer a reward generous enough to attract pollinators and yet stingy enough that the pollinator needs to visit several flowers

in order to meet its foraging requirements. Increased flower visitation should increase the likelihood of successful pollination.

Conversely, pollinators would ideally visit only those flowers that provide an adequate reward relative to the time and energy invested in foraging. Assuming easy access to adequate rewards, the most efficient approach would be to forage randomly among species. In that case, however, the plants would be the losers: the pollen from one plant species might end up in the flower of an unrelated species, and the reproductive success of each species would be reduced.

The result of these conflicts in perspective has been the evolution of strategic compromises between plants and their pollinators. Examples can be found throughout the Arboretum grounds, enabling us to retrace major developments in these give-and-take relationships. They have contributed substantially to the aesthetic appeal of the Arboretum and, indeed, of gardens everywhere.

The magnolia family (Magnoliaceae), prominently displayed near the Hunnewell Visitor Center, is one of the most ancestral angiosperm families in the living collections. Members of the genus *Magnolia* possess a generalized floral morphology that does not discriminate among floral visitors: the flowers are radially sym-



The reflexed anthers of *Kalmia latifolia* in the left photo indicate an unpollinated flower. The photo at right shows how the anthers are released after pollinator visitation.



A truss of mountain laurel with some anthers still reflexed and yet to be pollinated, and some released, indicating pollination.



Communication between flowers and pollinators is common. In *Catalpa speciosa* the combination of dark brown splotches (most easily seen in the rightmost flower) and yellow patches orient pollinators to the location of the nectar.

metrical; the petals are many and large; and a central strobilus (cone) containing numerous stamens and pistils rises above the petals. A glance inside the flowers on a single tree reveals the result of this open-door policy: a diverse assemblage of flies, bees, and beetles can typically be found. Pollen is the only floral reward offered—not an ideal arrangement from the tree's viewpoint, since pollen is a primary food

source for some adult beetles and flies. Consequently these floral visitors are consuming rather than transporting the pollen, which reduces the reproductive opportunities for the tree; such is the downside to the easy-access approach. However, in most cases, some of the pollen sticks to the insects' bodies while they feed, to be deposited on the stigmas of flowers visited later.

In some cases, certain visitors are clearly inadequate as pollinators, a category that includes the indiscriminate forager. A visitor that acquires pollen from the flowers of species A and then visits the flowers of species B makes a poor pollinator; reproductive opportunities for both plants have been lost. Pollen from A is wasted if it ends up on B's flowers because fertilization does not occur. Additionally, the stigmatic surface of B is clogged by A's pollen, and this reduces B's reproductive capacity. Some plants have evolved a two-step solution to this problem: first, they contrive to attract pollinators capable of fidelity, and second, they develop ways to keep out all other visitors.

Walking up the Arboretum's main drive we encounter yellowwood (*Cladrastis kentukea*), scholar tree (*Styphnolobium japonicum*, formerly *Sophora japonica*), and bristly locust

(*Robinia hispida*), members of the legume family (Fabaceae). Unlike the magnolias, these plants have bilaterally symmetrical flowers with the pistil and stamens hidden inside a tight enclosure of petals. Only bees have the strength and coordination to manipulate the petals and gain access to the flower's interior and the nectar it holds; and unlike beetles and flies, bees show a good deal of species-level constancy

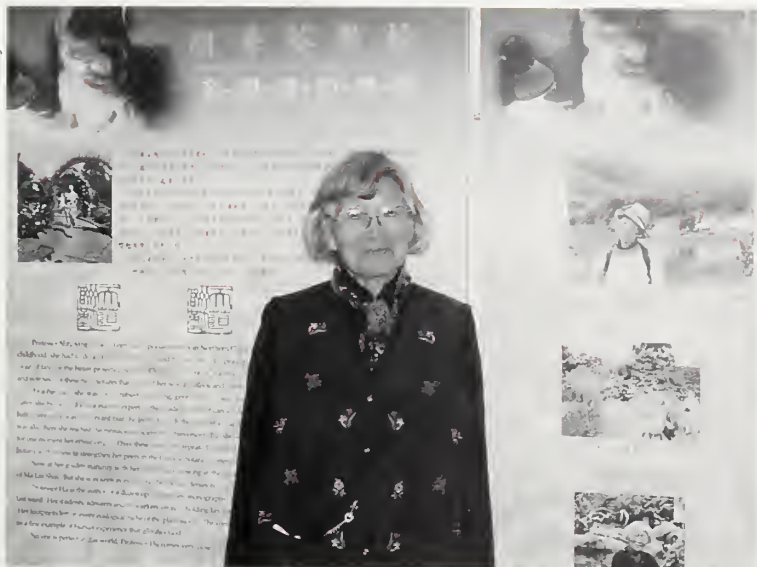
The Arnold Arboretum

S P R I N G • N E W S • 2 0 0 0

Symposium in Honor of Professor Shiu-ying Hu on the Occasion of Her 92nd Birthday

David E. Boufford, Assistant Director for Collections, Harvard University Herbaria

Che Chun-Tao & Ng Sze-Kai



Dr. Hu poses before panels that celebrate her long and distinguished career in botany.

Shui-ying Hu, botanist emerita of the Arnold Arboretum, was honored at the Chinese University of Hong Kong on February 19, 2000, with a special symposium and birthday celebration sponsored by the Ma Man Fai Chinese Medicine Education Foundation Fund.

Dr. Hu arrived in the United States from China in 1946 to enter graduate school at Radcliffe College. Her doctoral dissertation on the genus *Ilex* (Aquifoliaceae) was carried out at the Arnold Arboretum under the direction of E. D. Merrill, director of the Arboretum 1935–1946. Dr. Hu was an accom-

plished botanist before her arrival; she had conducted fieldwork in western Sichuan in the late 1930s and early 1940s, at a time when only a few men (notably, Armand David, Joseph Rock, and E. H. Wilson) had explored that region.

By the time Dr. Hu obtained her doctorate, just three years after her arrival, the American Philosophical Society had granted her funds to write an account of the flora of China. In support of her application, Karl Sax, Arboretum director 1946–1954, described her as “one of the most competent and industrious students I have ever known . . .” Those qualities have

been obvious to all throughout Dr. Hu’s career and have not diminished in her “retirement,” which is now of 25 years’ duration. Nor has her interest in all aspects of plants, particularly those of China, waned. She entered the new century still working ten-hour days and reading proofs of her 900-page book on the food plants of China, which will be published within the next few months.

Harvard Heroes Named

Robert E. Cook, Director

Each June for the past five years, Sally Zeckhauser, Harvard’s vice president for administration (VPA), has hosted a grand ceremony to honor as Harvard Heroes the individuals in her organization who have made a special contribution during the past year.

On June 14, I together with many other Arboretum staff attended this year’s ceremony, at which three of our employees were recognized for their extra efforts over the past year. All three contributed time and energy to a special initiative organized by Sally

• *continued on page 3*

Campaign Participants Celebrate

Despite the twenty-degree drop in temperature on May 9, 2000, spirits rose high at the Arboretum's capital campaign celebration. The event acknowledged the commitment and success of those involved in the recently completed \$8.25 million campaign. After a welcome from Arboretum director Robert E. Cook, guests were gratefully recognized for their good work by co-chair Noni Ames of the director's advisory board, campaign chair Francis O. Hunnewell, and Harvard provost Harvey V. Fineberg. Also recognized was Lisa M. Hastings who, as director of development during the campaign, spearheaded the fundraising.



Celebrating a successful campaign are, from left, Francis O. Hunnewell, Lisa M. Hastings, Robert E. Cook, Mary E. Wilson, and Harvey V. Fineberg.

Former Director Recognized

Richard A. Howard, former director of the Arnold Arboretum and professor of dendrology emeritus of Harvard University, has recently received two distinguished honors. One, the 1999 Allerton Medal, recognized his significant contributions to the conservation of tropical plant diversity. The medal is awarded by the National Tropical Botanical Garden based in Kalaheo, Hawaii; the citation acknowledges his "decades of heroic service in the advancement of tropical horticulture and the understanding of tropical plants."

More recently, Dr. Howard's botanical work in the Caribbean islands was acclaimed at a symposium on the flora of the Antilles held recently at the New York Botanical Garden. The tribute included a much-relished painting of *Cubanola dominicensis* by the NYBG's botanical artist Bobbi Angel.



Dr. Howard, photographed in 1971 on the somma of St. Vincent's Soufrière, preparing specimens of a plant new to botany and known only from this location. Just two years later the volcano erupted, giving *Lindernia brucei*, which Dr. Howard named for his son, a very brief tenure in botany.

Dr. Howard is the author of the six-volume *Flora of the Lesser Antilles* as well as many other works on tropical botany.

Arboretum Exhibit Awarded Two Medals

Julie Coop, Superintendent of Grounds

The Arnold Arboretum's exhibit at the 2000 New England Spring Flower Show was honored with two medals. The Garden Club of America Bulkley Medal recognizes a special exhibit in the fields of horticulture, botany, or conservation that possesses exceptional educational merit and increases the knowledge and awareness of the viewing public. The Massachusetts Horticultural Society also awarded the exhibit a Gold Medal for Horticultural Merit.

The intent of the exhibit was to illustrate the collaborations of some of the many talented people associated with the Arboretum, both past and present. These gifted people work to bring plants from the wild to the Arboretum grounds and beyond, perhaps even to the viewing public's own backyard. Lilies, dawn redwoods, and other plants introduced into cultivation by the Arnold Arboretum were featured along with informative text, illustrations, and herbarium specimens. The focal point of the exhibit was a large group photograph taken in 1916 of



Peter Don Easden

Arnold Arboretum staff, past and present. The Arboretum's New England Spring Flower Show exhibit was designed, installed, and maintained by, from left, Jack Alexander, Julie Coop, John Olmsted, Keiko Satoh, and Tom Por. A poster-sized photograph of illustrious past Arboretum staff is behind them.

Sargent, our first director; Wilson, renowned plant collector; Faxon, botanist and illustrator of *Silva of North America*; Rehder, taxonomist extraordinaire; and Camillo Schneider, a German plant collector and dendrologist who, forced to abandon fieldwork in China, sought asylum and employment at the Arboretum during World War I.

Karen Madsen



Candace Julyan, John DelRosso, Sheila Connor

• from page 1

to improve the quality of the workplace for all employees of VPA. John DelRosso is one of the exceptional arborists who helps maintain the high quality of our collection of woody plants. Sheila Connor is our research archivist and heads our horticultural library in Jamaica Plain. Candace Julyan heads up all our educational programs for adults, children, and visitors to the grounds.

At the ceremony all three individuals were personally thanked by Neil Rudenstine, president of Harvard, for their dedication to the University and its mission, and for the special contribution that the Arboretum makes to research and education. On behalf of the entire staff, I express my personal appreciation to John, Sheila, and Candace for a job well done.

Arboretum Staff Changes

David Russo, facilities supervisor, came to the Arboretum last March from Harvard's planning and real estate department, where he served as building superintendent for faculty and graduate students.



He brought with him to Harvard twenty years' experience as a carpenter, five of those years in his own carpentry business. As facilities supervisor, Dave manages all of the Arboretum's buildings, both in Jamaica Plain and at the Case Estates in Weston. Much of his job involves finding, scheduling, and overseeing contractors, but from time to time he finds an occasion to keep up his cabinet-building skills as well.



Sheryl Barnes joined the Arboretum in April as web project manager. In this new position Sheryl will manage the websites of the Arnold Arboretum (www.arboretum.harvard.edu) and the Institute for Cultural Landscape Studies (www.icsl.harvard.edu). Sheryl's previous position was with the Center for Health and the Global Environment of Harvard Medical

School, where among other responsibilities she managed the center's website. She has also worked for the Massachusetts Public Interest Research Group. Sheryl is a graduate of Cornell University with a double major in biology and society and in government.

The newest member of our grounds crew is Bethany Grasso, who started work as gardener in early June. Most recently Bethany worked for Perennial Gardens, a garden design and installation company in Roslindale. Earlier,



she gained a good deal of practical experience through internships served at the Hampshire College Farm Center, the Arnold Arboretum, and Longwood Gardens. Bethany earned her bachelor of science in plant and soil science,

with a concentration in sustainable agriculture, from the University of Massachusetts, Amherst. She is a Massachusetts-certified arborist.

Also of note on the grounds is Tom Por's move from gardener to arborist. Tom, who hails from St. Thomas, Ontario, served as an Arboretum intern in 1997 and as our apprentice in 1998.

Joe Melanson, who has been a visitor information assistant in the Arboretum's education department for the past four years, recently acquired his professional library degree. He will use his skills and knowledge in his new position as assistant archivist in the library.

Within the education department, Ellen Bennett has been promoted from manager of horticultural information to assistant director of education. In her new role, Ellen will oversee the adult education program, children's education program, and visitor services. Though she will continue to oversee horticultural information, many of the tasks associated with her past position will move to the visitor services assistants.

20th Annual Fall Plant Sale

Please join us for the 20th Annual Fall Plant Sale, to be held this year on Sunday, September 17, 2000, at the Case Estates in Weston.

An enticing variety of trees, shrubs, and herbaceous perennials selected by Arboretum staff will be sold in and around the barn. The barn will open to members at the sustaining level and above at 8:00 a.m., to all members at 9:00 a.m., and to the general public at 10:30 a.m.

Other events of the day include a live auction featuring rare and choice plants; a specialty sales tent with unusual plants donated by generous individuals and nurseries; and Society Row, where representatives of more than 20 plant societies will sell plants and offer advice. Knowledgeable plantspeople will be on hand to answer questions.

For more information about the plant sale or to become a member of the Friends of the Arnold Arboretum, please call Karen O'Connell at 617/524-1718 x 165. Members will receive the plant sale catalog in August and will receive free plants and a discount on plant purchases in the barn on the day of the sale!

while foraging. Bees visit legume flowers for their nectar, as this sugar-based solution fuels their flight. Many legumes use “spring-loaded” stamens to ensure that the bees they nourish earn their meal. As a bee makes its way into the flower to collect the nectar reward, the flower’s spring-loaded stamens are tripped, propelling its pollen onto the bee’s underside. When the bee visits the next flower, the pollen is deposited on the stigma as the bee enters, and pollination has been effectively, and efficiently, achieved.

Legumes are not alone in using spring-loaded stamens to affix pollen to visitors. Mountain laurel (*Kalmia latifolia*), a member of the heath family (Ericaceae) and a New England native, can be found throughout the Arboretum. Over evolutionary time, petals on the flowers have

fused to form a cuplike structure that offers a steady landing surface for pollinators. Inspect the flower closely and you will see that the anthers are held in small depressions that ring the inner periphery of the petal tissue. This creates tension on the filaments that hold the anthers, as their other end is anchored lower down in the center of the flower. Each stamen therefore looks like a small catapult. The pressure of a pollinator walking on the petal surface sets off one or several of these catapults, and the pollen is plastered onto the visitor’s body.

Signals are the attraction strategy of choice for several taxa in the Arboretum. *Catalpa speciosa* (western catalpa), like other members of the bignone family (Bignoniaceae), can be found on Bussey Hill just above the lilac collection. It produces large, white, tubular flowers with a pronounced lower lip. Looking inside a flower one notices two distinctive features: one, a pair of broad yellow stripes that start near the mouth of the tube and terminate at its base, and two, some small, brownish-purple splotches scattered throughout the tube. To our eyes it is color and pattern beautifully arranged, but to bees these are guides to that highly prized reward, nectar.

In some taxa, signalling to potential pollinators continues even after the flowers have been pollinated. Red buckeye (*Aesculus pavia*), of the horse-chestnut family (Hippocastanaceae), is found growing along the main drive just beyond the *Cornus* collection. It produces red tubular flowers with yellow nectar guides that attract pollination by bees, but here, after a flower is pollinated, the guides “turn themselves off” by changing from yellow to pink (Weiss 1995). To understand the benefits of such a signal, consider once again the perspective of the bees.

Many pollinating bees sip nectar continuously in order to fuel the flight muscles that carry them between the flowers they visit and the brood they provision with pollen. Like all animals, bees strive for maximum foraging efficiency. After encountering several unrewarding flowers on a single plant, a bee is likely to move on to another nearby. As a result, the plant that is snubbed loses reproductive opportunities. By turning off the nectar guides of the flowers that have already been visited, the red buckeye

ARCHIVES OF THE ARNOLD ARBORETUM



Members of the *Aesculus* genus, including this horse-chestnut, *A. x planeriensis*, maximize the size of inflorescence display by retaining pollinated flowers. Pollinators distinguish between virgin and pollinated flowers on the basis of colored patches on the petals.



The faintly darker patch on the petals of this *Weigela middendorffiana* indicate that the flowers have been pollinated.

directs pollinators to profitable flowers, thereby enhancing their efficiency while improving its own reproductive opportunities. Other taxa in the Arboretum that employ post-pollination signaling either through color or morphological changes in floral parts include flowering weigela in Caprifoliaceae, Scots broom (*Cytisus scoparius*) in Fabaceae, and goldenrain tree (*Koelreuteria paniculata*) in Sapindaceae (Weiss 1995).

Flowering plants are certainly not above practicing deception in order to attract pollinators. Like restaurant owners, they live in a competitive world where the biggest challenge is persuading the desired clientele to stop in and where advertising may be a useful tool. Within some taxa there is a positive correlation between flower size and the amount of reward: the bigger the flower, the more pollen or nectar to be found. However, some plants don't always back up their advertising.

Doublefile viburnum (*Viburnum plicatum* f. *tomentosum*) is in Caprifoliaceae; it grows in the viburnum collection located near the Dana Greenhouses. Snow-white flowers are produced in flashy, flat-topped cymes that few human visitors fail to notice. However, close inspection of an individual cyme reveals that its showiness resides in the ring of large (0.75 to 1.5 inches wide) sterile flowers that surround an interior cluster of unenticing fertile flowers. The primary role of the sterile flowers is to attract pollinators—rather deceptively, since they offer no reward. Much like restaurant customers who find that the special of the day is no longer being served, pollinators will nevertheless indulge themselves in whatever rewards the fertile flowers do offer before leaving.

A final example brings us back to the Hunnewell Visitor Center. In my view, *Actinidia arguta* (bower actinidia), a vine in Actinidiaceae, boasts the most innovative pollination mechanism found at the Arboretum. It grows along the fence just south of the main entrance. This species is primarily dioecious, meaning that there are separate male and female plants. Pollen is extracted from the male flowers through an amazing process known as “buzz pollination” (Buchmann 1983, Proctor et al. 1996). A visiting bee grabs the anthers with its legs and then vibrates its wings while remaining stationary. This generates an acoustic resonance that causes pollen grains to pour out of the anthers and onto the bee's body. When the bee forages for nectar in a female *A. arguta* flower, pollination is achieved.

This has by no means been an exhaustive account of pollination mechanisms on display at the Arnold Arboretum. Examples can easily be found to illustrate the adaptive significance of many other pollination-related flower characteristics; the positioning of the ovary with respect to the petals and sepals, inflorescence architecture, and floral fragrance all have adaptive value in the context of pollination. Clearly, successful pollination, a challenge faced by all vascular seed plants, has been solved in many ways. The Arnold Arboretum provides in a single location an unusually comprehensive taxonomic collection that allows visitors to observe the remarkable innovations that have

resulted from the mutualistic relationship between plants and their pollinators. Viewing the living collections at the Arnold Arboretum as a pollination biology museum reminds us that the diversity of flower shapes, colors, and sizes that brighten our gardens, entertain our minds, and touch our spirits have their origins in a relationship that was initiated over 100 million years ago.

Literature Cited

- Buchmann, S.L. 1983. Buzz pollination in angiosperms. *Handbook of experimental pollination biology*, ed. C.E. Jones & R.J. Little. New York: Van Nostrand Reinhold, 73–113.
- Cooper-Driver, G. 1994. *Welwitschia mirabilis*: A Dream Come True. *Arnoldia* 54(2): 2–10.
- Dodd, M.E., J. Silvertown, and M.W. Chase. 1999. Phylogenetic analysis of trait evolution and species diversity variation among angiosperm families. *Evolution* 53: 732–744.
- Leppik, E.E. 1960. Early evolution of flower types. *Lloydia* 3: 72–92.
- Norstog, K. 1987. Cycads and the origin of insect pollination. *American Scientist* 75: 270–278.
- Proctor, M., P. Yeo, and A. Lack. 1996. *The natural history of pollination*. Portland, OR: Timber Press, 179–180.
- Takhtajan, A. 1991. *Evolutionary trends in flowering plants*. New York: Columbia University Press, 171–184.
- Waser, N.M., L. Chittka, M.V. Price, N.M. Williams, J. Ollerton. 1996. Generalization in pollination systems, and why it matters. *Ecology* 77: 1043–1060.
- Weiss, M.R. 1995. Floral color change: a widespread functional convergence. *American Journal of Botany* 82(2): 167–185.



Deception can reduce metabolic costs associated with pollinator attraction. Large sterile flowers draw pollinators toward the diminutive fertile ones of Viburnum plicatum f. tomentosum.

David Giblin was an intern and curatorial associate in the Arboretum's plant records department. Since then, he has earned a master's degree in conservation biology from the University of Washington and is currently a doctoral candidate at the University of Missouri where he is studying the relationship between pollinators and floral longevity.

A Fresh Look at a Traditional Favorite: Rhododendrons

Richard Brooks

Rhododendrons have been used extensively in New England landscapes for nearly a century and a half. Everywhere you go you see them: in parks and public buildings, lined up in front of filling stations, in residential foundation plantings, and sometimes even naturalized in woodlands. I think that qualifies them as “traditional favorites.”

But I would guess that 99 percent of the rhododendrons commonly seen represent a very small group—perhaps ten or a dozen—of “tried and true” varieties, such as ‘Roseum Elegans’, or the ubiquitous ‘PJM’, or the evergreen azalea ‘Hino Crimson’, or occasionally some of the flamboyant Exbury hybrid deciduous azaleas.

Now I have nothing against these old-timers. They have proven their mettle by surviving and flourishing despite the vicissitudes of our notorious New England climate. But they represent only the tip of the iceberg—a small fraction of the spectrum of size, form, foliage, and flower that characterize this extraordinary genus.

The genus *Rhododendron* is one of the largest in the plant kingdom. There are between eight



'Firestorm'

hundred and one thousand species that inhabit the wild areas of the world, and from them have been developed (and are still being developed) literally tens of thousands of hybrids. They range in size and habit from forty-foot trees to spreading groundcovers only a few inches tall; from leaves a massive fifteen inches in length to a diminutive dime size; and flowers from large trumpets to tiny stars, in nearly every color of the rainbow.

In this article I will introduce a small sample of this large and varied palette—plants that are proven performers in New England's hardiness zones 5 and 6 (and some even in zone 4) but are virtually unknown and unused by landscape professionals and home gardeners.

In landscape value these can be grouped into several categories: First, plants that represent the expanded range of flower color that is now available. Second, plants of low-growing and even dwarf stature that are more appropriate for today's smaller properties. Third, plants that extend the blooming season from early April through late July or even August. And



'Bali'



'Wojnar's Purple'



'Calsap'



'Casanova'

last, plants with special foliage interest that makes them even more valuable during the fifty weeks a year that they are not in bloom.

A Fresh Look at Flower Colors

One fault found by many landscape professionals with the standard "ironclad" varieties is that the bloom color—especially the pinks and reds—is tainted with a purplish or lavender cast. Rejoice! Many hybrids with blooms in clear, unflawed colors are now available. One of the most outstanding of these is 'Bali', which has a neat, dense, mounding habit, reaches three to four feet in height and five to six feet in diameter at maturity, and bears flowers of a pale pink, lit with a yellow throat. 'Dexter's Champagne' has a more open, rangy habit, which I can overlook for the sake of its creamy blossoms, tinged pink. 'Janet Blair', with large, ruffled, pale pink flowers, is acquiring a reputation as an all-time great performer in the eastern United States, equaling if not surpassing in vigor and reliability another pink-flowered rhododendron, the well-known and often used 'Scintillation'.

Among the reds, 'Vivacious', bred at the Vineland Station in Ontario, offers cardinal-red blooms untainted with purple and superb leathery foliage. 'Firestorm', an introduction of the late Dr. Gustav Mehlquist of Connecticut, blooms with deep red flowers late in the season, usually the first or second week in June. And a sister seedling, 'Scarlet Romance', carries the vivid color of 'Vivacious' into that same period.

The old English cultivar 'Purple Splendour' is still popular in milder climates for its intense, deep violet flowers, but unfortunately it is not reliable in zone 5 and often fails even in zone 6. Happily, we now have several hybrids that supply the same regal color on a much hardier plant. One is 'Jonathan Shaw', with a low, densely branching habit; another is 'Wojnar's Purple', another Mehlquist introduction, which grows somewhat taller.

The old English hybrid 'Sappho' draws rave reviews for its snow-white flowers with a startling blotch, or flare, of deep purple, but it is hopelessly tender for much of New England. Its hardier counterparts are 'Calsap' and 'White Peter', both with a fairly tall but densely branching habit.

Yes, Virginia, yellow rhododendrons really do exist, although until recently none were reliably hardy in the Northeast. But we now have a number of yellow- and near yellow-flowered evergreen rhododendrons that are reliably hardy in zones 5 and 6. 'Arctic Gold' and 'Big Deal', both introductions of Weston Nurseries in Hopkinton, Massachusetts, form reasonably dense, medium-growing shrubs with excellent foliage. 'Vinecrest', another introduction from Ontario, has light yellow blossoms that emerge from peach-colored buds on a taller, more open plant.

'Capistrano', one of the last introductions of that master hybridizer, the late David Leach, forms a dense, low-growing mound with deep green foliage and flowers of a no-nonsense yel-



Rhododendron degronianum subsp. Yakushimanum, bovee dwarf form.



'Edmond Amateis'

low. 'Casanova', also from Leach, has a similar habit and pale yellow flowers spotted with apricot-orange, opening from near-red buds. 'Santa Fe', somewhat taller growing, blooms in an unusual shade of orange-pink.

For white-flowered cultivars to set off this rainbow array of colors, one could hardly improve on two more hybrids from Dr. Leach: 'Edmond Amateis', which carries huge trusses of white flowers highlighted by a touch of red in the center on a vigorous, stiff, upright plant; and 'Dolly Madison', whose pink buds soften to white upon opening, with a more spreading and open habit of growth.

A Fresh Look at Smaller Rhododendrons

We've all seen new houses with "foundation plantings" of cute little rhododendrons plunked down along the front under the windows. They



'Dorothy Swift'



'Percy Wiseman'



'Tow Head'

look great for two or three years, and the owners are delighted with the color they provide every spring. But rhododendrons have a way of growing, and in time the kinds that are commonly used in this way can get very large indeed. Before you know it, those cute little mounds are engulfing the house and blocking out the view. You can cut them back, of course, but you'll be faced with the same problem again in a few more years. If you must provide a foundation planting (and I'm suggesting that there are alternatives), at least use lower-growing rhododendrons; they will provide all the benefits of evergreen foliage and colorful bloom without frequent pruning. Such rhododendrons abound in today's nursery catalogs, and many of them are based on the species *Rhododendron yakushimanum* (now properly *R. degronianum* subsp. *yakushimanum*).

The species "Yaks" form a neat, dense, self-branching mound, from one to two feet tall at ten years of age. The leaves are held by the plant five or six years, sometimes even longer (versus the two or three years that the old ironclads retain their leaves), and display a thick, felt-like coating of fine hairs (indumentum) on the underside. The flowers open white from pink buds.

Plant breeders have gone wild over this species, crossing it with many other kinds in an attempt to capture its desirable traits of habit and foliage in hybrids with different colored blossoms. 'Hachmann's Polaris' retains the pink color in the flower instead of fading to white; 'Dorothy Swift', another introduction from Dr. Mehlquist, features the same colored blossoms as the species in a somewhat larger growing plant. (Most "Yak" hybrids are larger growing than the species.) 'Percy Wiseman' is already popular for its profuse peaches-and-cream flowers.

For really tight spaces there are dwarf plants, some even suitable for the rock garden: 'Ginny Gee' forms a spreading mound only 18 inches tall and two to three feet wide at maturity and smothers itself in bloom every spring. 'Tow Head' brings pale yellow blossom color to this group.



'April Gem'

A Fresh Look at an Extended Blooming Season

Most rhododendron fanciers are familiar with *Rhododendron mucronulatum*, the so-called "Korean Azalea" (actually not an azalea at all, but a small-leaved rhododendron that happens to be deciduous); it opens the flowering season in early to mid April. A few years ago, this and 'PJM' were nearly the only April-flowering rhododendrons commonly available. Now early bloomers are available in a range of colors—'April Snow', another Weston introduction, with pure white, double, star-shaped flowers; 'April Song', still another from Weston, with soft pink flowers; 'April Gem', a Mehlquist hybrid, with fully double, white flowers like miniature gardenias; and 'Landmark', from Weston, with nearly red single flowers.

A brief digression: I'm often asked what the distinction is between azaleas and rhododendrons. Botanically speaking, all azaleas belong to the genus *Rhododendron*. They constitute two of the eight subgenera into which taxono-



'Summer Snow', photographed the last week in June



'Alexander'

mists have divided the genus: the deciduous azaleas (subgenus *Pentanthera*) and the so-called evergreen azaleas (subgenus *Tsutsusi*). Both groups are distinguished from other rhododendrons by several characteristics: their leaves and stems never have scales, as do such small-leaved rhododendrons as 'PJM' and *R. mucronulatum*; their flowers usually (but not always) have five stamens, unlike the other rhododendrons, which usually have ten or more stamens; and the hairs on azalea leaves are always simple, never branched, unlike the hairs that constitute the indumentum on species such as *R. yakushimanum*.

Having established what an azalea is, let's now consider extending rhododendron bloom beyond Memorial Day. Usually we don't look for much except in the late-flowering rosebay, *Rhododendron maximum*. But the flowers of *R. maximum* are small and not very showy and



Rhododendron makinoi



'Indian Run'



'Teddy Bear'

tend to be hidden by the new leaves, which form much earlier. Now rhododendrons are available with large, impressive flowers that appear long after the midseason kinds are but a memory. Two examples are 'Summer Snow', a David Leach hybrid with snowy white flowers, and 'Summer Glow', with vivid pink flowers.

Bloom can be extended even into late summer with some recent deciduous azalea introductions, bred from several late-flowering, native American species. Just a sampling: 'Millenium', near-red bloom in early to mid July; 'Golden Showers', peach buds that open yellow, turning creamy white, in mid July; 'Pennsylvania', light pink, blooms in late July to early August. These azaleas have two additional virtues. Many of them are fragrant, and their foliage is much more resistant to mildew than the older Exbury hybrid azaleas, which often look pretty shabby by the end of our interminably hot and humid summers.

For prostrate groundcovers, Polly Hill's evergreen azalea introductions can hardly be surpassed. Their mature height is less than a foot, and they spread to cover an area two to three feet in diameter. A couple of examples are 'Alexander', flowering in late June, the color of ripe watermelon, and 'Late Love', a light pink.

A Fresh Look at Rhododendron Foliage

Varied foliage types and sizes can provide many diverse textures in the green landscape before and after the relatively brief blooming season. *Rhododendron makinoi* has long, narrow, almost spiky leaves. *R. kiusianum*, the Kyushu azalea from Japan, has delicate sprays of tiny, glossy leaves; its flowers, as an added bonus, come in a range of colors from white through pinks and lavenders to near-red.

The new growth of some forms of *Rhododendron degronianum* are handsomely colored by a powdery tomentum (dense matted hair). In 'Teddy Bear' the persistent indumentum on the leaf undersurface is a bright cinnamon color. In 'Golfer' the white tomentum covering the new growth persists for most of the summer, making a vivid contrast with the glossy dark green of the older leaves.



Rhododendron ponticum 'Variegatum'



Rhododendron ponticum 'Goldflimmer'

Finally, there are even rhododendrons with variegated foliage: *Rhododendron ponticum* 'Variegatum', with gray-green leaves edged in white, unfortunately not reliably hardy in zone 5 but fine in milder parts of zone 6 and along the Atlantic coast and Cape Cod, and 'Goldflimmer', which has a completely different leaf pattern, green-streaked and mottled yellow.

Some Cultural Pointers

Planted in too much sun, a rhododendron can resemble a variegated shrub. The old ironclad varieties are often planted in full sun, and yes, many of them tolerate the exposure—but tolerance does not constitute preference. They may

bloom prolifically, but they always look stressed: the foliage tends to a yellow instead of deep green, and the annual growth is short and stunted. A rule of thumb is that the larger the leaf, the more shade the plant prefers. *Rhododendron maximum*, for instance, grows well in almost full shade. On the other hand, the small-leaved types, like 'PJM' and both deciduous and evergreen azaleas need plenty of sun to grow and bloom well.

Besides the amount of sun and shade, the most important cultural factors to consider are the following. First, plant rhododendrons in well-drained, open-textured, acid (pH 4.5 to 6.0) soil that contains copious quantities of coarse organic matter. (Remember that soil near a foundation, especially in older buildings, may be alkaline due to leaching of lime from mortar.)

Second, plant them shallow. Rhododendrons have a naturally shallow root system, and if the rootball is covered with soil, the roots can suffer from lack of oxygen. The top of the rootball should actually be *above* the surface of the surrounding soil.

Third, provide a year-round mulch of coarse organic matter to insulate the shallow roots from extremes of heat and cold, to conserve soil moisture, and discourage weeds. Pine needles, rotted woodchips, chopped oak leaves and pinebark are all appropriate for mulch, but be sure not to pile it against the stems of the plant, which will encourage disease. And finally, ask your growers and suppliers for these less-than-common rhododendrons and begin enjoying them soon.

Dick Brooks, a past president of the American Rhododendron Society, was awarded the Gold Medal of that organization in 1998. In 1999 he received the Massachusetts Horticultural Society's Jackson Dawson Memorial Award for skill in the hybridization and propagation of hardy woody plants.

ARNOLD ARBORETUM
HARVARD UNIVERSITY



BULLETIN
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NUMBER 5

RHODODENDRONS. What a privilege it would be, if we could call back as we walk through the collection, the men who have contributed to the development of our garden rhododendrons. They would make an interesting and varied assemblage—Dean Herbert, the Earl of Carnarvon, Sir J. D. Hooker, blunt Anthony Waterer, John Fraser, gentle Peter Collinson in his Quaker garb, and Baron Ungern Sternberg. For the rhododendrons of our gardens are quite literally something new under the sun; there is nothing just like them in nature. Aristocratic cosmopolites, they came into being in Victorian England when species from the Old World and the New were sympathetically gathered by plant collectors and intelligently blended by a few hybridizers.

The contributing species are all mountain lovers. From the lower slopes about the Mediterranean and Black Seas comes *Rhododendron ponticum*; higher up in the Caucasus are the hardier *R. caucasicum* and *R. Smirnowii*. Our own southern mountains contributed the hardy and attractive *R. catawbiense* which occurs by thousands of acres on the upper slopes of the southern Alleghenies. Near the North Carolina boundary among the open balsam woods and natural meadows which form the summit of Roan Mountain, it reaches as far as the eye can see, growing in scattered groups in the open meadows and forming a dense undergrowth beneath the balsams. It was from this very locality that it was first collected for European gardens by John Fraser, over a hundred years ago. Fraser was a Scotchman, who as a very young man, like many another Scotchman, had gone to London to seek his fortune. He eventually became one of the most successful of those early plant collectors who ransacked the American continent to provide novel and beautiful plants for European gardens. He had phenomenal success in Russia where he became a favorite of Catharine the Great. After her death, by Imperial ukase, he was sent back to America with orders to furnish rare and novel plants for the imperial collections. "Accompanied by his eldest son, John, he embarked in the year 1799 for the southern states of North America, where he prosecuted his researches in various unexplored parts of the continent. On the summit of the Great Roan or Bald Mountain, on a spot which commands a view of five states, it was Mr.

Fraser's good fortune to discover and collect living specimens of the new and splendid *R. catawbiense*, from which so many beautiful hybrid varieties have since been obtained by skillful cultivators." *

Another American species, the rosebay, *R. maximum*, has been little used by the English hybridizers, unfortunately so for American gardens, since it is one of the hardiest of the lot. It is of particular interest to New Englanders for it is occasionally found native as far north as Sebago Lake and southern New Hampshire. It was among the American plants introduced into England by the Quaker botanist Peter Collinson. The religious bond between English and American Quakers kept up a lively interchange between the two countries. Quakers had always been interested in gardening; George Fox, the founder of the Society of Friends, had specified that the "nature of herbs, roots, plants, and trees" should be taught in Quaker schools. What more natural then, but that packets of seed and pressed plants and much garden information should pass back and forth between the two countries. In this way *R. maximum* was sent from the New World to the Old and in Peter Collinson's "Commonplace Book for June 26, 1756" we find the entry, "The great mountain laurel or rhododendron flowered for the first time in my garden."

One other species, the showiest of the lot, *R. arboreum*, came from the foothills of the Himalayas. It contributed splendor to the garden rhododendrons for it is a great shrub-like tree with large flowers of bright red, varying in different strains from bluish pink to a black crimson. Unfortunately, it brought in a tropical aversion to cold along with all this tropical splendor. *R. arboreum* itself can barely be grown out-of-doors even in England; it was not until it had been hybridized with hardy American species that a plant was produced which could withstand the English winters. English hybridizers, however, have continued to use *R. arboreum* and other lovely but tender species in their work. The result is a glorious group of flowering shrubs but one which Americans must cross the ocean to see. Only a few of the thousand or more named varieties will stand our hot summers and cold winters. Among the pinks we can recommend "Mrs. C. S. Sargent" and "Henrietta Sargent" in deep pink and "Lady Armstrong" and "Roseum elegans" in rose pink. The hardest reds are "Charles Dickens," and "H. W. Sargent." In dark purple the best are "Purpureum grandiflorum" and "Purpureum elegans."

Most of these ironclad varieties are the creations of one man, Anthony Waterer, an English nurseryman who became a sort of godfather to American gardeners. His particular affection for Americans came about in an interesting way. When Andrew Jackson Downing laid out the grounds about the National Capitol, he ordered plants from Waterer. The plants were received but before payment was made Downing had died. His friend and neighbor, Henry Winthrop Sargent, when settling the estate found Waterer's unpaid bill. By the influence of his college classmate Charles Sumner, he got a special bill through congress and Waterer was eventually paid. Now, Anthony Waterer was a forthright, John Bull sort of a man, as strong in his likes as in his dislikes. Sargent's action led to a lifelong friendship, one which was large enough to include Sargent's

* Condensed from the account by Sir William Hooker, in the "Companion to the Botanical Magazine."

friends and his friend's friends as well. It was Henry Winthrop Sargent who brought Anthony Waterer and his rhododendrons to the attention of his cousins, H. H. Hunnewell and Charles Sprague Sargent. It was this friendship which led to the great rhododendron collections at the Hunnewell estate in Wellesley, at Professor Sargent's home in Brookline, and at the Arnold Arboretum.

In growing rhododendrons it is necessary to remember their likes and dislikes. They hate a limey soil. They dislike hot sun in the spring and summer, cold winds in winter. They like partial shade and a soil which is well drained but moist at the roots. The situation provided for them in the Arnold Arboretum is almost ideal. The bold ridge of hemlocks to the south screens them from the sun and helps to keep the soil moist at the roots. Even there they could be grown in greater perfection if they were more sheltered from winter winds and from adventuresome small boys. This latter pest is a very real problem in growing rhododendrons at the Arboretum. Anyone who was ever a boy does not blame the urchins for wanting to play about in the Bussey Brook and to crawl up through the rhododendron beds among the giant bushes. Yet anyone who knows rhododendrons and their needs knows that this crawling is very hard on the bushes. Twigs snap off and sunshine strikes at the roots. The passing of hundreds of pairs of little feet, and little knees as well, wears out the very soil. The rich, cool mulch which has so carefully been built up is scuffed away and bit by bit the collection succumbs.

Of late years rhododendrons here and elsewhere in New England have been attacked by the lacewing fly. These bizarre little creatures are scarcely larger than the head of a pin. Under the microscope they appear like humpbacked monsters dressed in lace. Monsters they are in action as well as appearance, for they gather under the rhododendron leaves and suck its juices. They can be successfully controlled by using an oil spray but their attacks are kept to a minimum if the rhododendrons are planted in semishade. The insects dislike the shade; the shrubs prefer it, therefore such a situation is doubly preferable.

One of the Caucasian species, the handsome *R. Smirnowii*, thwarts the lacewing fly by clothing its leaves below with a mat of woolly hair. So protective is this covering that even the hybrids between *R. Smirnowii* and the other species are practically immune. Fortunately, for the next generation of American gardeners, hybridizers are at last at work creating new varieties for this country, varieties which will be winter hardy and summer hardy, which will at least discourage attack from the lacewing fly and which will, nevertheless, compare with present-day English varieties in the size and beauty of their flowers.

EDGAR ANDERSON

A geneticist at the Missouri Botanical Garden and professor of botany at Washington University in St. Louis for most of his career, from 1931 to 1935 Edgar Anderson (1897-1969) oversaw the care of the Arnold Arboretum's living collections and conducted its relations with the public. An interesting and prolific writer, two collections of his essays are in print, *Plants, Man and Life* and *Landscape Papers*. As regards small boys and lacewing flies, the former appear to have found other pursuits but the latter remain.

In Pursuit of Ironclads

Karen Madsen

Rhododendrons were celebrated embellishments of nineteenth-century England's great estates, but these star performers did not find a place in New England gardens until hybridizers solved a dilemma: the hardy species lacked good color, and species with good color lacked hardiness. The American *Rhododendron catawbiense* possessed hardiness, but bore flowers of "a disagreeable purple rose." Species with desirable color, such as the deep red Himalayan *R. arboreum*, lacked hardiness, even in much of Britain. Over the century European plantsmen developed hundreds of hybrids with *R. catawbiense* as the primary hardy parent. In the 1850s Anthony Waterer

TERRY HUNT, UNDATED. ARCHIVES OF THE ARNOLD ARBORETUM



of Knap Hill nursery in Surrey began hybridizing rhododendrons for color, but especially for hardiness. David Leach described Waterer's achievement in *Rhododendrons of the World* (1961), "For their time [his hybrids] represented a triumph of the hybridist's art: the principles of heredity in plant breeding were not then in use; there were but a handful of species available as parents; and the English climate did not test the full limit of hardiness which Waterer had imparted to his creations with such remarkable success." A visitor described Knap Hill (seen in the photo above) in 1892.

The Knap Hill nursery is the most extensive, as it is the oldest, establishment in England in which the cultivation of American plants has been made a specialty. Its extent exceeds 200 acres, of which more than 60 acres are allotted to the cultivation of American plants. . . . Running straight through the nursery is a very long carriage-drive connecting two public roads, and this drive Mr. [Anthony] Waterer generously permits the public to

use, with certain reservations as to dogs, etc. Thousands of people go every year to Knap Hill to see the wonderful display made by the Rhododendrons and Azaleas. Whit-Monday is quite a gala day, the crowd being so great that the workmen of the nursery have to act as patrols to keep the visitors in order. To understand all this one must see the plants for himself. I had no idea that the display was so magnificent . . . Of course, when it is remembered that these plants have been a specialty in this nursery for more than a century, that the best varieties have nearly all been raised there, and that the Waterers have always been what is called Rhododendron mad, the extent and interest of the collection are to some degree accounted for. . . ."

—Visitor, 1892, *Garden and Forest* V(227): 304–306

A pioneer in rhododendron culture in New England, H. H. Hunnewell of Wellesley, Massachusetts, first wrote of planting rhododendrons in his diary of 1856, when *hardy* meant summering in the ground but wintering indoors, like figs. Each year he recorded conditions and performance and shared his knowledge freely and enthusiastically. In 1896 he found reason to congratulate himself.

June [1896]. In looking back over the horticultural records that I have been in the habit of making in this journal for more than forty years, I find I have invariably at this season expressed my admiration of our beautiful show of rhododendrons, though until of latter years my plants were small and so limited in number that they have made a very modest appearance compared with the thousands in my collection at the present time, many of which are more than fifteen feet in height and fifty feet in circumference. . . .



ALFRED REIDER, 1900 ARCHIVES OF THE ARNOLD ARBORETUM

At the H. H. Hunnewell estate, the lavender-rose 'Everestianum', an old favorite developed by Anthony Waterer at midcentury. An 1892 letter to *Garden and Forest* reported that in early June the magnificent trusses of Hunnewell's rhododendrons were "distinguishable miles away."

It is a singular fact that this shrub and the *Kalmia latifolia*, both natives of this country, should be so little cultivated here; for among hardy plants they are undoubtedly the most ornamental, and the rhododendron especially stands at the head of the list of rare and desirable shrubs in England,—and well it may, for it combines more qualities than any other shrub during the entire year, with its gorgeous trusses of a dozen or more flowers of every shade imaginable of white, purple, and crimson, its magnificent evergreen foliage, and, lastly, its noble habit of growth. . . .

I have heard it whispered about that I have too many rhododendrons—as if one could have too many diamonds! In reply I say it has been my aim and desire for half a century to possess the largest and best collection of this shrub of any one in the country, and I have succeeded, and feel proud of my success. It has been my hobby, I confess, and I have worked hard for it; but it has not prevented my giving attention to other things and having a liberal supply of other shrubs, though they attract very little notice from my numerous visitors compared with the rhododendrons.

—Notes on Rhododendrons, 1896, *Life, Letters and Diary of Horatio Hollis Hunnewell*, ed. Hollis Horatio Hunnewell, privately printed, 1906

Most Americans discovered rhododendrons in 1876 when Anthony Waterer brought 1,500 plants in 80 varieties to the Centennial Exhibition in Philadelphia. (He presented most of those plants to C. S. Sargent, and in the 1880s sent what he thought to be his hardiest varieties to the Arnold Arboretum for testing.) The Philadelphia display was an eye-opener: gardeners were smitten, Americans ordered hundreds of thousands of plants from England and began hardiness trials in earnest. Lists of the hardiest hybrids appeared frequently in garden magazines, not least in C. S. Sargent's weekly, *Garden and Forest* (1888–1897), and from 1911 the Arboretum's *Bulletin of Popular Information*.

Expectations were very high and hopes even higher; year after year promising new hybrids appeared. But weather took its toll on most of those candidates, and near the end of his life Sargent lost patience: "More money has been wasted probably in this country during the last fifty or sixty years in attempting to cultivate broad-leaved evergreen Rhododendrons, for which with few exceptions the climate is not really suited, than on any other plants (1926)." Nonetheless in the 1920s a short list of reliably hardy catawbiense hybrids emerged, earning the tag *ironclad*: 'Album Elegans', 'Album Grandiflorum', 'Atrosanguineum', 'Delicatissimum', 'Everestianum', 'Mrs. Charles S. Sargent', 'Roseum elegans', 'Purpureum Elegans', 'Purpureum Grandiflorum', and a few others.

Three-quarters of a century later, five original Waterer plants on that list still grow in the Arboretum at the base of Hemlock Hill: 'Album Grandiflorum' and 'Purpureum Grandiflorum' planted in 1886; 'Album Elegans' and 'Purpureum Elegans', 1891; and 'Atrosanguineum', 1896. Not on the list are four other survivors from the nineteenth century: 'Bicolor', 'Delicatissimum', 'Mrs. Harry Ingersoll', and 'Parsons Grandiflorum'. The latter was bred at Knap Hill but introduced by the only American nursery to hybridize rhododendrons in the nineteenth century, the Long Island firm of Samuel B. Parsons. Not until the 1920s, after the passage of Quarantine No. 37, when imports were banned, prices rose, and supply diminished, did other American plantsmen turn to hybridizing these American plants. Sargent would be cheered by the results.



Album Grandiflorum (1886)



Bicolor (1891)



Atrosanguineum (1896)



Mrs. Harry Ingersoll (1891)



Purpureum Elegans (1891)



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Covers: Advertisements assembled from issues of *Garden and Forest*.

Inside front cover: A group of young *Pinus ponderosa*, probably one hundred feet high, growing in the Yosemite Valley where they were photographed by W. H. Rollins. Originally published in *Garden and Forest*, 1895.

Inside back cover: Three venerable, windswept *Cedrus libani* ssp. *atlantica* (Mount Atlas cedar), photographed in Algeria by Maurice L. de Vilmorin. Published in *Garden and Forest*, 1896.

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GARDEN AND FOREST PUBLISHING CO.,

Tribune Building, New York.

Preface

Much of my time and attention during the year has been devoted to the establishment of a weekly publication intended to extend and popularize the knowledge of trees and their cultivation, and of gardening and garden-botany. There existed no journal or periodical bulletin, published in this country, in which the results of the experiments carried on in the Arboretum, and the mass of facts about plants could be printed promptly and regularly, so that they could reach the large number of students now interested in this subject. The first issue of *GARDEN AND FOREST* appeared on the 29th of February, and there is already reason to believe that this journal will aid materially in increasing the educational value of the Arboretum and in extending its influence.

—Charles S. Sargent, 1888 Report to the President of the University

This issue of *Arnoldia* and the next are devoted to that publication, *Garden and Forest, A Journal of Horticulture, Landscape Art and Forestry* (1888–1897). Founded and “conducted” by the Arnold Arboretum’s first director, C. S. Sargent, funded by him and by the same Boston Brahmins who had underwritten the Arboretum, and published and edited in New York, it was not *officially* an Arboretum publication. Nonetheless, true to Sargent’s intent, its 512 issues comprise a trove of information on the Arboretum’s plant collections. But Sargent’s ambitions for the journal extended much farther than the Arboretum, encompassing the entire plant world and stretching even to the welfare of the nation. An 1891 flyer called it “indispensable not only to the practical Horticulturist, Botanist, Landscape-Gardener and Forester, but to every owner of a Country or Suburban Home who desires sound instruction in all branches of ornamental and economic planting.” It continued:

GARDEN AND FOREST contains from week to week articles showing how grounds can be laid out to the best advantage; how lawns should be made and kept; what trees and shrubs are effective for decoration and suited to the diverse climates of the American Continent, and how these should be planted and cared for. It endeavors, by instruction or suggestion, and by constant reference to pertinent principles of good taste, to aid those who desire to beautify their homes. It aims also at arousing intelligent interest in the care and management of public places, such as Parks, School-grounds, Cemeteries, etc., and at furthering the efforts made for the improvement of highways and the beautifying of roadsides. The department devoted to

Forestry treats of preservation and management of our forests, subjects of vital and urgent importance to the nation's welfare. GARDEN AND FOREST is alone in this field.

With all that, the recital does not mention that its weekly seven-to-eleven pages also broached agronomy, entomology, and pathology, reviewed books and recent periodicals, listed exhibitions and expositions, and even covered the retail flower market. What was once said about Sargent himself can be said about his magazine: nothing connected with plants was alien to it.

We are devoting this issue and the next to *Garden and Forest* because the Library of Congress, working with horticultural archivist Sheila Connor, has put the entire contents of *Garden and Forest* online (<http://lcweb.loc.gov/preserv/prd/gardfor/digitizegf.html>)—the first effort in its "digital reformatting program," a new method of making fragile publications available to a wide readership. To enhance the online text, our director, Robert E. Cook, has solicited essays on its coverage of botany, forestry and forest conservation, landscape art, and horticulture, and archivist Joseph Melanson is approaching the halfway mark in his compilation of a detailed and cumulative subject index that will greatly improve access to its contents.

The primary subjects of this issue of *Arnoldia* are botany and forestry as covered in *Garden and Forest*. Essays discussing the significance and influence of that coverage are accompanied by excerpts from the magazine. These are followed by an essay on the role of its editor, the little known, often forgotten William Stiles. Landscape art and horticulture will be the subjects of the next issue's essays, by Ethan Carr and Mac Griswold, also accompanied by several excerpts. The story of the Library of Congress' digitization project—the magazine's "journey into cyberspace"—will be related by project manager LeeEllen Friedland. A word of explanation may be helpful: excerpts from *Garden and Forest* are printed on a tinted background, and brackets indicate editorial interpolations.

Garden and Forest is a journal of tremendous historical interest, but also of surprising relevance to contemporary issues. We hope this brief immersion in a century-old magazine proves as absorbing to read as it was to edit.

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As indicative of the value of GARDEN AND FOREST as a medium of business announcement, attention is invited to the following extracts from recent letters of some regular advertisers :

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GARDEN AND FOREST will be devoted to Horticulture in all its branches, Garden Botany, Dendrology and Landscape Gardening, and will discuss Plant Diseases and Insects injurious to vegetation.

Professor C. S. SARGENT, of Harvard College, will have editorial control of GARDEN AND FOREST.

Professor WM. G. FARLOW, of Harvard College, will have editorial charge of the Department of Cryptogamic Botany and Plant Diseases.

Professor A. S. PACKARD, of Brown University, will have editorial charge of the Department of Entomology.

Mr. WM. A. STILES will be the Managing Editor.

GARDEN AND FOREST will record all noteworthy discoveries and all progress in science and practice within its field at home and abroad. It will place scientific information clearly and simply before the public, and make available for the instruction of all persons interested in garden plants the conclusions reached by the most trustworthy investigators. Arrangements have been made to figure and describe new and little-known plants (especially North American) of horticultural promise. A department will be devoted to the history and description of ornamental trees and shrubs. New florists' flowers, fruits and vegetables will be made known, and experienced gardeners will describe practical methods of cultivation.

GARDEN AND FOREST will report the proceedings of the principal Horticultural Societies of the United States and the condition of the horticultural trade in the chief commercial centres of the country.

GARDEN AND FOREST, in view of the growing taste for rural life, and of the multiplication of country residences in all parts of the United States, especially in the vicinity of the cities and of the larger towns, will make a special feature of discussing the planning and planting of private gardens and grounds, small and large, and will endeavor to assist all who desire to make their home surroundings attractive and artistic. It will be a medium of instruction for all persons interested in preserving and developing the beauty of natural scenery. It will co-operate with Village Improvement Societies and every other organized effort to secure the proper ordering and maintenance of parks and squares, cemeteries, railroad stations, school grounds and roadsides. It will treat of Landscape Gardening in all its phases; reviewing its history and discussing its connection with architecture.

GARDEN AND FOREST will give special attention to scientific and practical Forestry in their various departments, including Forest Conservation and economic Tree Planting, and to all the important questions which grow out of the intimate relation of the forests of the country to its climate, soil, water supply and material development.

Original information on all these subjects will be furnished by numerous American and Foreign correspondents. Among those who have promised contributions to GARDEN AND FOREST are:

Mr. SERENO WATSON, Curator of the Herbarium,
Harvard College.

Prof. GEO. L. GOODALE, Harvard College.

" WOLCOTT GIBBS, "

" WM. H. BREWER, Yale College.

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" WM. J. BEAL, Agricultural College of Michigan.

" L. H. BAILEY, JR., "

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" B. D. HALSTED, "

" F. W. HILGARD, University of California.

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" CHAS. E. BESSEY, University of Nebraska.

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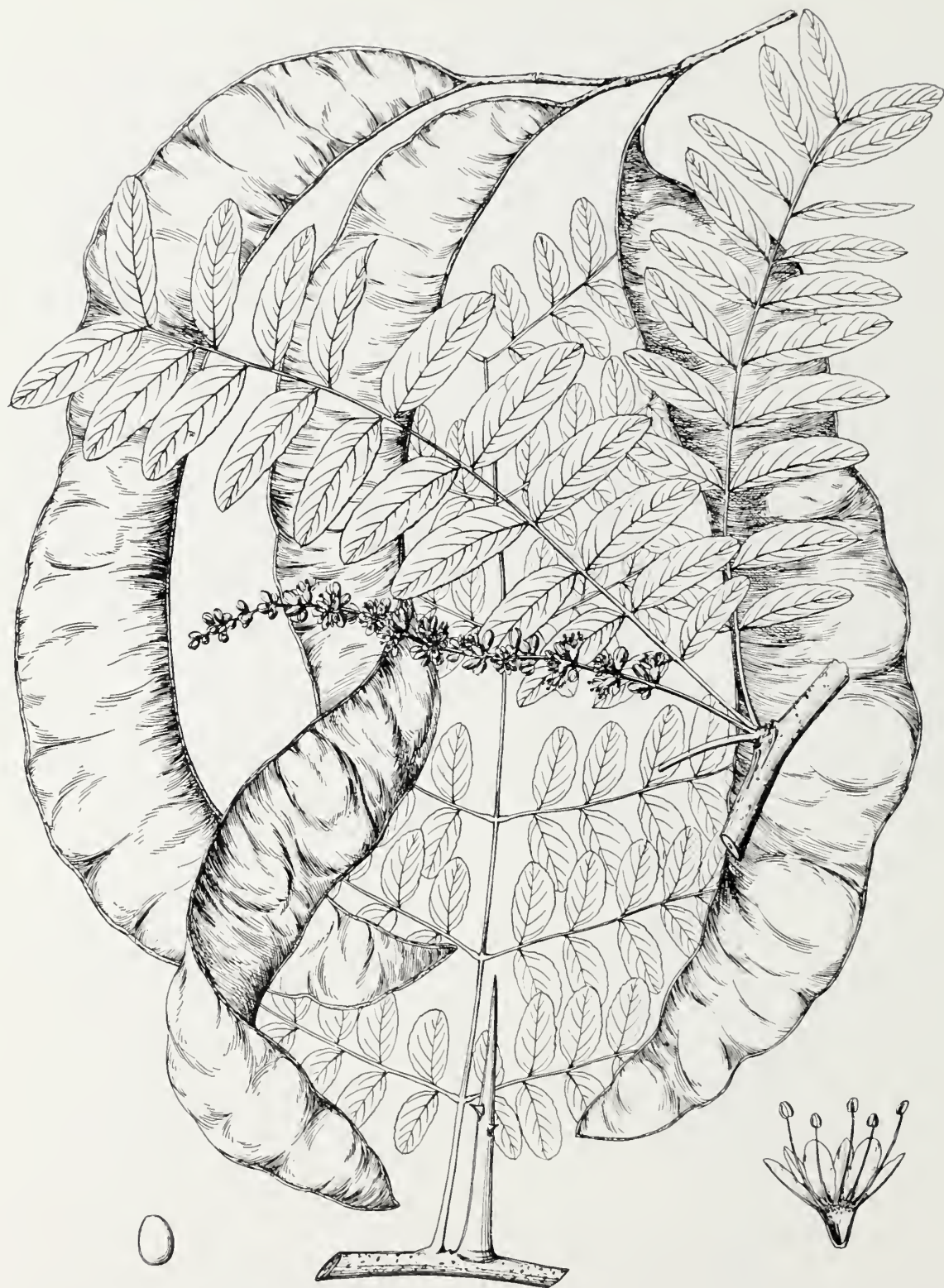
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THE GARDEN AND FOREST PUBLISHING CO., LIMITED,
 TRIBUNE BUILDING, NEW YORK
 D. A. MUNRO, *Manager*



Gleditsia japonica. One of the 285 botanical drawings made by C. E. Faxon for Garden and Forest. From volume 6, page 165.

Garden and Forest: The Botanical Basis of It All

Stephen A. Spongberg

On February 29, 1888, the weekly periodical *Garden and Forest, A Journal of Horticulture, Landscape Art and Forestry*, was inaugurated. Rather oddly, the statement outlining the purpose of the new publication, along with an extensive list of future contributors, was relegated to a page in the advertising section that preceded the main text. It was evident, however, that the journal had been inspired by similar publications in England, including the long-running *Journal of Horticulture, Cottage Gardener, and Country Gentleman's Companion*. In particular, its format and content mirrored in many respects that of *The Gardener's Chronicle*, which had begun publication in 1841.

Somewhat oddly, the first article to appear in *Garden and Forest* was an obituary. Asa Gray, the preeminent Harvard botanist, had died a month earlier on January 30. The obituary summarized briefly the long and extremely distinguished career that had earned for Gray (and for American botany along with him) the respect of the international scientific community. American botany was no longer the exclusive domain of Europeans; American scientists, under Gray's leadership, had established their own scientific traditions. It was through his studies of the American flora, particularly his comparisons of Japanese plants to their close relatives in North America, that Gray had achieved international recognition. These observations, demonstrating the close similarity between the floras of eastern North America and eastern Asia, had lent credibility to his defense of Darwin's writings and played a crucial role in the development of botany and of its sub-discipline, phytogeography.

But it should not surprise us that Charles Sprague Sargent began the first issue of *Garden and Forest* with a glowing tribute to Asa Gray for Sargent had been Gray's protégé, and it was thanks to him that Sargent had been asked to

prepare the *Report of the Forests of North America (Exclusive of Mexico)* for the Tenth Census of the United States (1880)—an important stepping stone in his career. Equally important, Gray had nominated and campaigned for Sargent to be named the founding director of the Arnold Arboretum of Harvard University and, simultaneously, the director of the Harvard Botanic Garden, positions Sargent had accepted in 1872. As a consequence of these positions and of his natural talents and interests, Sargent had become an accomplished botanist and administrator and had established strong relationships with botanists worldwide; and following in Gray's footsteps, he would add significantly to botanical scholarship during his fifty-five year tenure at the Arnold Arboretum. Sargent had discussed with Gray his intention to found *Garden and Forest* and had looked forward to his mentor's continuing advice and his contributions to the periodical.

It was clearly obvious that *Garden and Forest* was to be a *botanical* publication: a cursory glance at the indices published for each volume shows the dominance of plant names (in botanical Latin form). Sargent realized that it was a knowledge of botany that was to inform the development of all the other disciplines he intended the journal to foster: horticulture, landscape art, and forestry. In the first issue Max Leichtlin, a German botanist and horticulturist, wrote about "New Plants from Afghanistan," and George L. Goodale, first director of Harvard's Botanical Museum, reviewed a key to the forest trees of Kansas and the latest edition of Asa Gray's *Elements of Botany*. Other contributors included the noted field botanist Cyrus Guernsey Pringle and William Trelease, first director of the Missouri Botanical Garden, who co-authored a column entitled "Plant Notes." In the April 4 issue of the same year an editorial entitled "The Study of Botany by



Shortia galacifolia (*Oconee bells*), drawn by C. E. Faxon. In the first volume of *Garden and Forest*, C. S. Sargent wrote that "of all the plants studied and described and classified by Asa Gray, this little herb most excited his interest." Sargent's story of the loss and rediscovery of the plant appears in volume 1, pages 506–507.

Horticulturists" stressed the importance of a strong basis in botanical knowledge for any horticulturist; Asa Gray's successor at the herbarium in Cambridge, Sereno Watson, contributed a column entitled "New or Little Known Plants: *Rosa minutifolia*;" and William G. Farlow, another of Gray's appointees at Harvard, wrote on nitrogen fixation by plants in his article, "Tubercles on Leguminous Roots."

Each issue also provided references to the current botanical and horticultural literature in a section on "Recent Plant Portraits." In the May 2, 1888, number, another regular column made its first appearance: "Notes from the Arnold Arboretum." This feature was of special importance to Sargent, and the first contribution was authored by his assistant at the Arboretum, John George Jack. Over the succeeding ten years this column would document the development of the Arboretum, focusing particularly on the

many new plants discovered by the Arboretum's agents, many of which were introduced into cultivation by the Arboretum.

One of the most significant series of botanical articles to appear in *Garden and Forest* resulted from Sargent's 1892 sojourn in Japan, which inaugurated the Arnold Arboretum's mission to explore the floras of eastern Asia. Entitled "Notes on the Forest Flora of Japan," this series first appeared on January 18, 1893, and concluded in the December 27 issue of the same year. In 1894, the publishing firm of Houghton, Mifflin and Company collected these articles in one volume entitled *Forest Flora of Japan*, one of Sargent's most enduring publications, and of special interest as the first treatise in English on the then little-known trees of Japan. In these essays Sargent built on the pioneering work of his mentor Asa Gray by elaborating on the close relationships of the floras of eastern Asia and eastern North America.

Closer to home, the pages of *Garden and Forest* provided news about botanical discoveries and advances in

North America. New genera and species were described in its pages, such as the malvaceous genus *Robinsonella*, initially with two species (*R. cordata* and *R. divergens*) from Mexico, and articles on regional floras were commonplace. Among the latter were Carl Purdy's "The Flora of the California Coast Range," which appeared in three parts between May and June of 1896, and E. N. Plank's extensive "Botanical Notes from Texas," which appeared in twenty-five segments between January 1893 and May of 1895.

Specific plant groups were also featured in articles that recounted the taxon's discovery and naming, its native habitat, range, and ecology, as well as its usefulness in cultivation. Sargent's "Notes on Cultivated Conifers," appeared in thirteen issues of volume ten; Michael S. Bebb contributed a five-part series entitled "Notes on Some Arborescent Willows of North America" between September and



NEW OR LITTLE KNOWN PLANTS.
ROSA MINUTIFOLIA.

OUR wild Roses have an ill reputation among botanists for the uncertainty which often attends the determination of their species. But there are some, fortunately, about which there can be no doubt, and we have given the figure of one which carries its distinctive characteristics obtrusively to the front and cannot be mistaken. Not only is there no other American Rose like it, but it stands alone in the genus . . . It has been found only on the peninsula of Lower California, near All Saints (Todos Santos) Bay, about 40 miles south of San Diego, where it was discovered in 1882, forming low, dense thickets upon the dry hillsides bordering the shore. . . . Evidently the flower in its wild state cannot be commended as well suited to the florist's needs, but from its habit of growth the plant may well prove a decided ornament to the lawn and garden in our more southern States, where it would doubtless be hardy.

S[ereno] W[atson].

[*Garden and Forest* 2 (1888): 103. Engraving by C. E. Faxon]

December of 1895; and of a more practical nature R. H. Price wrote on the "Classification of Varieties of Peaches" in January of 1897.

The list of botanical themes goes on: biographical sketches of famous botanists of the past, including one in the May 1894 issue on Stephen Elliott (for whom the rare genus *Elliottia* had been named); an esoteric five-part series by W. R. Gerard on "Plant Names of Indian Origin," which appeared in June and July of 1896; and even features as technically challenging as John George Jack's "Some Unusual

Androgynous Flower-clusters," which ran in June of 1895. In fact, the scope of the articles that were published in *Garden and Forest* spanned the entire corpus of botanical science as it was known in the late nineteenth century. Taken together this literature comprises a remarkable trove of information that is not found elsewhere in botanical literature and that in many ways remains relevant even today, as well as of great historical value.

On December 29, 1897, the five hundred and fourteenth issue of *Garden and Forest* included an announcement that it was to be the magazine's last. This last issue brought the total number of pages published during *Garden and Forest's* ten-year life to an impressive five thousand six hundred and sixty-eight! The reason for termination was financial: "This experiment . . . has shown conclusively that there are not persons enough in the United States interested in the subjects which have been presented in the columns of *Garden and Forest* to make a journal of its class and character self-supporting." This was a sorry commentary on the dearth of interest among the wider American population in issues concerning botany, forestry, conservation, and landscape design.

Since the demise of *Garden and Forest*, no attempt has been made to re-institute the kind of interdisciplinary dialogue it had provided for a brief ten years. The several professional disciplines it addressed have evolved and diverged, becoming more and more distinct and isolated from one another. Even today a journal similar to *Garden and Forest* might face financial difficulties, but many would welcome a new vehicle for exchanging information and ideas among all the professions that are fundamentally plant-based.

Stephen A. Spongberg is Executive Director of The Polly Hill Arboretum in West Tisbury, Massachusetts, and Curator Emeritus of the Arnold Arboretum.

AN INTERESTING REDISCOVERY.

MRS. J. G. SMYTH, of Greenville, South Carolina, sends us fresh flowers of *Lonicera flava*, gathered by herself on Paris Mountain, probably in the very spot where this plant was last seen growing wild by any botanist. This was

in the year 1810, when John Fraser, a Scotch collector, paid a visit to Paris Mountain and gathered seeds or roots of this plant and sent them to England. From the descendants of these plants of Fraser's kept in gardens has been preserved the knowledge of this beautiful species. Last year a figure and description of *Lonicera flava* [yellow honeysuckle] were published in this journal (vol. iii., 187, f. 187), and the interest this excited in what appeared to be a "lost plant" led our correspondent to investigate Paris Mountain, a low outlying spur of the Blue Ridge which rises from the plain close to Greenville. Her search was successful, and on the 17th of April Mrs. Smyth found the Honeysuckle in flower, and now sends us specimens with this note:



Lonicera flava illustrated for *Garden and Forest*
by C. E. Faxon.

The plants were found, and this was the only place, on the north side of the mountain, a hundred and fifty or two hundred feet from the top or highest point of the mountain, which is 2,054 feet above the level of the sea. The *Lonicera* was growing in a very rocky place, about fifteen or twenty feet square, a place which looked, except for the many and large rocks scattered over it, as if it might have been a cleared spot. All around and about it the original foliage of the forest had never been disturbed, tall Oaks, and Chestnuts, and the thick undergrowth of Azaleas and Rhododendrons forming a dense shade. The soil is rich and black from the long accumulation of leaf-mold, damp and rich, and just such a soil as the Rhododendron grows and thrives in. The stems are not more than two feet high, but I thought would have grown longer if there had been any support for them to cling to and run on. The roots send out long runners, and these send up shoots from every little point, so that in trying to get a root one might pull up yards and yards before it would break.

Lonicera flava is one of the rarest of American plants, and although it has been known from the very beginning of the century, there is apparently no evidence that it grows anywhere except in this one spot on Paris Mountain. Mrs. Smyth's most interesting discovery removes another from the now short list of plants known to our early botanists, but unknown to their successors. Now that *Darbya*, *Shortia* and *Lonicera flava* have been found again, *Gordonia Altamaha* [now *Franklinia alatamaha*] and *Illicium parviflorum* [now *I. floridanum*, anise tree] are the only prizes left among species known to have existed to reward the botanical collector in the south Atlantic states. It is a curious fact that both of these plants, like *Lonicera flava*, have been preserved in gardens for nearly a century, although all recent efforts to find them in their native haunts have failed.

[*Garden and Forest* 4 (1891): 253-254]

from NOTES ON THE FOREST FLORA OF JAPAN—II.

TRAVELERS in Japan have often insisted on the resemblance between that country and eastern America in the general features of vegetation. But with the exception of Yezo, which is still mostly uninhabited and in a state of nature, and those portions of the other islands which are above 3,000 feet over the level of the ocean, it is difficult to form a sufficiently accurate idea of the general appearance of the original forest-covering of Japan to be able to compare the aspects of its vegetation with those of any other country, for every foot of the lowlands and the mountain valleys of the three southern islands have been cultivated for centuries. And the foothills and low mountains which were once clothed with forests, and might be again, are now covered with coarse herbage (principally *Eulalia*) and are destitute of trees, except such as have sprung up in sheltered ravines and have succeeded in escaping the fires which are set every year to burn off the dry grasses. Remoteness, bad roads, and the impossibility of bringing down their timber into the valleys have saved the mountain forests of Japan, and these may still be seen, especially between 5,000 and 8,000 feet over the level of the sea, in their natural condition. But these elevated forests are composed of comparatively few species, and if it were not for the plantations of Conifers, which the Japanese for at least twelve centuries, it is said, have been making to supply their workers in wood with material, and for the trees preserved or planted in the temple grounds in the neighborhood of towns, it would be impossible to obtain any idea at all of many of the Japanese trees. But, fortunately, the priests of Buddha have planted and replanted trees for a thousand years about their temples, which are often surrounded by what now appear to be natural woods, as no tree is ever cut and no attempt is made to clear up the undergrowth. These groves are sometimes of considerable extent and contain noble trees, Japanese and Chinese, which give some idea of what the inhabitants of the forests of Japan were before the land was cleared for agriculture.

The floras of Japan and eastern America have, it is true, some curious features in common, and the presence in the two regions of certain types not found elsewhere, show their relationship. But such plants are usually small, and for the most part rare or confined to the high mountains. *Diphylleia*, *Buckleya*, *Epigaea* and *Shortia* show the common origin of the two floras; but these are rare plants in Japan as they are in America, with the exception of *Epigaea* [trailing *arbutus*], and probably not one traveler in ten thousand has ever seen them, while the chief elements of the forest flora of northern Japan, the only part of the empire where, as has already been said, comparison is possible—those which all travelers notice—do not recall America so much, perhaps, as they do Siberia and Europe.

The broad-leaved Black Oaks, which form the most distinct and conspicuous feature in all the forests of eastern America, are entirely absent from Japan, and the deciduous-leaved White Oaks, which, in Japan, form a large part of the forest-growth of the north, are of the European and not of the American type, with the exception of *Quercus dentata*, which has no

related species in America. The Chestnut Oaks, which are common and conspicuous, both in the northern and southern parts of eastern America, do not occur in Japan, and the Evergreen Oaks, which abound in the southern part of that empire, where they are more common than any other group of trees, are Asiatic and not American in their relationships. . . .



The illustration gives some idea of the general appearance of the great coniferous forests which cover the highlands of central Japan. In the foreground, Lake Yumoto, famous for its thermal springs, nestles 5,000 feet above the sea among the Nikko Mountains. The forests which rise from the shores of the lake are principally comprised of Hemlock (*Tsuga diversifolia*), among which are Birch (*Betula Ermanni*), *Abies* and *Picea*, *Pterocarya*, *Cercidiphyllum* and the Mountain Ash [*Sorbus*]. In the dense shade by the shores of the lake grow dwarf forms of the Indian Azalea, *Elliottia paniculata*, our Canadian Bunch Berry (*Cornus Canadensis*), great masses of *Rhododendron Metternichii*, which in these forests replaces *Rhododendron Catawbiense* of the Appalachian Mountains, the dwarf *Ilex rugosa*, *Clethra*, here at the upper limits of its distribution, *Panax horrida* [devil's club], and the dwarf Blueberries which inhabit mountain slopes in all northern countries, as well as the ubiquitous Bamboos.

The forests of the two regions possess in common *Magnolia* and *Aesculus* [horse-chestnuts], which are more abundant in species and individuals in America than in Japan. The *Rhuses*, or Sumachs, are very similar in the two regions, and so are the Witch-hazel and the arborescent *Aralia*. *Cornus macrophylla* [now *C. controversa*] of Japan is only an enlarged *Cornus alternifolia* [pagoda dogwood] of eastern America, and the so-called Flowering Dogwoods of the two countries are very much alike. The Japanese Walnut is very like the American Butternut, while, rather curiously, the Japanese Thuja [red cedar] and the two *Chamaecyparis*, the *Piceas* [spruce] and *Abies* [fir], resemble species of Pacific North America, a region whose flora has little affinity with that of eastern Asia. *Torreya* is common to the two regions; in America it is one of the most local of all our trees, while in Japan it is abundant in the mountainous regions of the central and southern parts of the empire.

Apart from the characters which distinguish related genera and species of Japanese trees from their American congeners there are many aspects of vegetation which make the two countries unlike. The number of broad-leaved evergreen trees is much greater in southern Japan than it is in the southern United States, there being fifty species of these trees in the former, and only twenty in eastern America (exclusive always of southern Florida), and the general aspect of the groves and woods at the sea-level, even in the latitude of Tokyo, is of broad-leaved evergreens. The number of evergreen shrubs in proportion to the entire flora is much greater in Japan, too, than it is in America, and plants of this character grow much further north in the former than in the latter country. The small number of species of *Pinus* in Japan, and their scarcity at the north, is in striking contrast to the number and distribution of this genus in eastern America, where there are thirteen species, to only five in Japan (including one shrub). In Japan the Hemlock forms continuous and almost unbroken forests of great extent on the mountain-slopes, which are over 5,000 feet above the sea, while in eastern America this tree is rarely found except scattered in small groves or as single individuals through the deciduous-leaved forests. . . . The wild Grape grows in the damp forests of Yezo with a vigor and to a size which the American species do not attain, even in the semi-tropical climate of the southern Mississippi valley. *Actinidia arguta* climbs into the tops of the tallest trees, and nothing is so un-American or so attracts the attention of the American traveler in Japan as the trunks of trees clothed to the height of sixty or eighty feet with splendid masses of the climbing *Hydrangeas* (*H. petiolaris* and *Schizophragma*), or with the lustrous evergreen foliage of the climbing *Evonymus*. *Wistaria* is represented, it is true, in eastern America, but here it is nowhere very common or one of the chief features of vegetation as it is in Japan; and the Ivy, a southern plant only in Japan, and not very common, helps to remind the traveler that he is in the Old and not in the New World.

C.S.S[argent]

[*Garden and Forest* 6(1893): 38–39]

THE KNEES OF THE BALD CYPRESS: A NEW THEORY OF THEIR FUNCTION.

To the Editor of GARDEN AND FOREST:

Sir.—From time to time, during and since my first visit to our southern tier of states in 1876, I have examined, sketched and photographed the roots of the Deciduous Cypress—the *Taxodium distichum* of Richard. I was attracted to the tree because of the singular beauty of its form and foliage and by the unusual boldness with which it raises its great, gray, smooth column, sometimes over a hundred feet, perpendicularly, above and upon what an engincer would pronounce a most dangerous foundation—loose submerged sand, the saturated morass or the soft alluvium of low river margins. But notwithstanding this seeming insecurity, I have never found a healthy Cypress that had fallen before the fierce hurricanes that sweep through the southern forest-lands.

The surprising and characteristic temerity of the tree is accompanied by another striking peculiarity—it almost invariably, in soft soils, throws upward from the upper surface of its roots conspicuous protuberances that are known as "Cypress knees."

These seemingly abnormal growths have attracted much attention, and for more than half a century have furnished an enigma to the solution of which scientific travelers have addressed themselves. . . .

In 1887 I had the good fortune to find a number of Cypress-trees under such unusual conditions that their aforetime subterranean anatomy could be studied without obstruction, and I reached a conclusion respecting the use to the tree of the protuberances . . . Some recent publications on the subject, by widely and favorably known authors, have, however, ascribed to the Cypress-knees the sole function of aerating the sap of the parent tree, and this idea bids fair to become embedded in botanical literature. . . .

Stretches of the shore of Lake Monroe, in central Florida, are closely set with large Cypress-trees. They grow in various kinds of bottom—clay, mud and sand. Those of which I shall here speak stood in sand so loose that when the level of the water was lowered the waves readily washed it away and carried it into the depths of the lake. Some vertical feet of the root-system was thus finely exposed. After several days spent in examining a score or more large trees that had been thus denuded I became convinced that the most important function of the Cypress knee is to stiffen and strengthen the root, in order that a great tree may anchor itself safely in a yielding material. . . .

The accompanying picture is from a photograph that I made in 1887 of the lower portion of a tree that rises some seventy feet above the shore line of Lake Monroe. The original surface of the sand was near the level of the higher roots. The picture shows the manner in which this peculiar species throws out horizontal roots from its conical (usually hollow) buttressed base. At different distances from this conical base these horizontal roots project strong branches more or less perpendicularly into the earth. Where such perpendicular "flukes" branch from the main horizontal "shank," it will be seen, there is formed a large knob, which is the "knee" under discussion. This knee, when fully developed, is generally hollow, comparatively soft, gnarled, and very difficult to rupture, so that it has the quality of a spring that becomes more rigid as it is extended or compressed out of its normal shape. When in a hurricane the great tree rocks back and forth



Denuded roots of the Bald Cypress, showing knees and underground structure.

on its base, and with its immense leverage pulls upon this odd shaped wooden anchor instead of straightening out in the soft material as an ordinary root might, thus allowing the tree to lean over and add its weight to the destructive force of the storm, it grips the sand as the bower-anchor would do, and resists every motion. The elasticity at the point of junction allows one after another of the perpendicular flukes attached to the same shank to come into effective action, so that before being drawn from the sand or ruptured the combined flukes present an enormous resistance. . . .

Finally, I may perhaps be permitted to add an observation regarding the roots of other trees that trench upon the same soils affected by the Cypress and often take advantage of the anchors it sets so boldly in treacherous bottoms. These trees project their cable-like, flexible roots in every direction horizontally, interlacing continually until a fabric is woven on the surface of the soft earth like the tangled web of a gigantic basket. . . . Such communities of trees, provided with ordinary roots, advance against and overcome enemies where singly they would perish in the conflict. The cyclone, the loose sand, the morass—these are the enemies they contend with, as it were, in unbroken phalanx, shoulder to shoulder, their shields locked, their spears bristling against the foe; but the graceful plumed Cypress, the knight-errant of the sylvan host, bearing with him his trusty anchor—the emblem of Hope—goes forth alone and defiant, afar from his fellows, scorning the methods of his vassals, and planting himself boldly amid a waste of waters, where no other tree dare venture, stands, age after age, erect, isolated, but ever ready to do battle with the elements. Twenty centuries of driving rain and

snow and fierce hurricane beat upon his towering form, and yet he stands there, the stern, gray and solitary sentinel of the morass, clinging to the quaking earth with the grasp of Hercules, to whom men were building temples when his wardenship began.

New York, Jan. 2d.

Robert H. Lamborn

[*Garden and Forest* 3 (1890): 21–22]

THE KNEES OF THE BALD CYPRESS.

To the Editor of GARDEN AND FOREST:

Sir.—I have read the interesting essay of Dr. Lamborn in your issue for January 8th with great pleasure. My own observations on the knees of the Cypress do not seem to me reconcilable with Dr. Lamborn's hypothesis. The objections which they raise to it are as follows:

1st. The trees on the sandy uplands need the assumed support quite as much, if not more, than those which grow on the neighboring loam—often clayey—of the inundated bottoms, yet these upland forms always lack the excrescences.

2d. While a slight upward growing protuberance would doubtless strengthen the root, the tall column exhibited by many knees would have no value in this regard.

3d. The summits of the knees normally attain a height which brings them above the level of the water in the growing season; when they cannot attain this elevation the tree fails to develop. When, by the subsidence of the land at an earthquake, or the artificial flooding of the area by dams, the crests of the knees are brought under permanent water, the condition is fatal to the plant.

4th. The fact that the Cypress-knees serve as respiratory organs is made the more probable by the existence of sharp upward flexures of the roots of the Tupelo (see "Effect of permanent moisture on certain forest trees" in *Science* [xiii., 176; March, 1889]. These flexures, as there shown, are horseshoe-shaped curves of the whole root, which, like the Cypress-knees, rise above the level of permanent water. On the Tupelo these structures are clearly of no advantage as anchors. Dr. Wilson and others have shown that similar structures exist in many plants.

I was aware that roots extended downward from the base of the Cypress-knees, but it seemed to me that the position of these roots was to be attributed to disturbance in the circulation and growth, brought about by the development of the knees rather than that the knees gave rise to the vertical roots.

Although I cannot at present agree with Dr. Lamborn in his main view, his paper seems to me a very important contribution to a discussion which promises to throw much light on the laws of plant development.

Harvard University.

N. S. Shaler

[*Garden and Forest* 3 (1890): 57]

Editor's note: It appears that both correspondents were incorrect. C. A. Brown and G. N. Montz wrote in *Baldcypress: The Tree Unique, The Wood Eternal* (1986): "The concept that baldcypress knees are pneumatophores has not been accepted experimentally, but the knees have been shown to conduct respiration. The height of knees cannot, in all cases, be correlated to the average high water levels. Only knees attached to low, conical trees may be used to determine the

average height of floodwaters in a given swamp. Knees, when present, may aid in strengthening of the basal support, but they apparently do not function as anchoring devices for the trees since those without knees are wind-resistant. Knee formation is considered to be a response to the aero-hydroperiod. Based upon all studies to date, we conclude that storage of starch (which can be converted back into glucose as needed) is the major function of baldcypress knees."]

THE TUPELO TREE.

THE forests of eastern America contain few trees more interesting to the botanist or of greater ornamental value than the Tupelo, Pepperidge, Sour Gum or Water Gum, as one of the American representatives of the small genus *Nyssa* is popularly called in different parts of the country. This genus was so named by Linnæus for a water nymph, because the species known to him, inhabitants of our far southern states, grow usually in shallow ponds or deep swamps overflowed for a considerable part of each year. Its nearest American relatives are the Cornels [dogwoods], from which *Nyssa* differs principally in its five instead of four-parted flowers, which are rarely perfect, but produce their male and female organs separately, while the flowers of the Cornels are perfect, and, in its alternate leaves, the leaves of our Cornels being opposite except in the case of a single species.

The distribution of the genus is exceptional and interesting. Three species, or four, according to the opinion of some excellent observers, inhabit different parts of eastern North America from Maine to Texas. . . . This is not the place, and it is not our intention, to discuss at this time the limits of the different American species, which have puzzled botanists ever since they have known them, the confusion beginning with Linnæus himself, who included two very distinct species under his original description. It is our purpose merely to call attention to one of the species still little known or appreciated by planters as an ornamental tree. This is the *Nyssa* which is generally distributed through all the eastern portions of the United States south of the southern part of the state of Maine and central Michigan. *Nyssa aquatica* appears to be the correct botanical name for this tree, although it is only in the extreme south that it grows in water. [The specific *N. aquatica* is now used only for that southern population and *N. sylvatica* for the more northerly and abundant populations.] Near the coast of the northern states it always grows by the borders of swamps in low, moist ground; and in the interior, especially on the lower slopes of the high Allegheny Mountains, where it attains its greatest size, it is found at considerable distances from the water-courses and associated with the Oaks, Magnolias, Hemlocks, Hickories and Ashes which form the principal part of the forest-growth. Here the Tupelo grows sometimes to a height of considerably more than a hundred feet, with a tall, stout trunk three or four feet in diameter, and short slender branches, contracted in their development by its neighbors in the forest. Near the coast it is always a much smaller tree, especially in the southern states, and it is rare to find it more than fifty feet high except in the mountain forests or in those of the lower Ohio valley—a region of exceptional and extraordinary tree-growth. . . .

The Tupelo was introduced into England in 1808 by John Lyon, an English plant-collector who traveled widely in North America early in the century. It was doubtless sent earlier to France, as it is hardly possible that Michaux could have



The value of the Tupelo as an ornamental tree is shown in our illustration representing a group of these trees growing naturally near a small pond in the town of West Medford, Massachusetts, and made from one of the excellent tree portraits for which we are indebted to Mr. Henry Brooks.

failed to introduce such a distinct and beautiful tree into the plantations of his native land. Whether this is true or not it is certain that no American tree is now more rarely seen in Europe, and a really fine specimen outside of America is not easily recalled. . . . The roots are remarkably stout and long, with few rootlets, so that the trees are never easy to move unless they have been grown in the nursery and specially prepared for transplanting. It is easily raised from seed, however, the seedlings are easily transplanted, and if they are set while still young where the trees are to grow permanently, no difficulty will be experienced with them. Even large plants dug up in the swamps can be successfully moved if extraordinary care is taken in the operation, but for the ordinary cultivator it is best to depend on small, nursery-grown plants when they can be obtained.

The Tupelo should be more often seen in ornamental plantations than it is at present. The habit of this tree when allowed sufficient room in which to grow is striking and interesting and quite unlike that assumed by any other of our hardy trees. The foliage is abundant and lustrous, and in the autumn it assumes a brilliancy and splendor of coloring unrivaled by that of our other trees. It is one of those trees which always attract attention—in the winter by its peculiar habit, in summer by the beauty of its foliage and in autumn by its coloring. . . .

[*Garden and Forest* 3 (1890): 485–486]



A SLAUGHTERED GIANT.

OUR illustration shows a *Sequoia gigantea* with choppers at work inside the cleft cutting their way through the trunk. This is not a tree of the first size, being less than twenty-five feet in diameter and about twenty at the point where it was cut. In point of beauty and symmetry it was one of the best of the surviving Big Trees. It stood until a year ago in the Tule River forest, Tulare County, California, and was sold by the private owner of the land to certain persons who wished to exhibit it. The plan was to take a section of the trunk, hollow it out to a shell and then divide it into convenient and portable pieces, so that it could be carried about and set up as a show. The project fell through, however, for lack of funds, and the section of the slaughtered tree never got beyond Visalia, in the county where it stood. It is now stored in that city. Let us hope that the original owner of the tree and its destroyers may some day realize that it will never again make such an exhibition of grandeur and grace as it did while towering above the spot where it began life as a seedling a thousand years ago.

[*Garden and Forest* (1890) 3: 570]

A High-Grade Paper: *Garden and Forest* and Nineteenth-Century American Forestry

Char Miller

Stephanne B. Sutton made no grand claims in her 1970 biography of Charles S. Sargent for *Garden and Forest*, the weekly horticultural magazine he published between 1888 and 1897. While acknowledging that it was a "first-rate publication," deftly edited by the talented journalist William A. Stiles, and conceding that it was "an immediate success," she also contrasted the effusive praise it received with its lack of "popularity"; the plaudits may have been "gratifying," but a larger circulation would have eased the journal's incessant "financial crisis." Small in number, its readers included "people who worked with plants—foresters, nurserymen, botanists, landscape designers, and others whose opinions mattered" in scientific and political arenas. By its coverage of matters botanical, the "magazine did its small part to raise the horticulturist from amateur to professional standing"; its words, "when quoted in a politician's speech or in the column of a popular newspaper . . . carried authority."¹

Yet neither small circulation nor brief existence diminishes the magazine's historical significance: it was arguably the most important late-nineteenth-century forum for discussing the role of science in human affairs. Those who wrote about horti-

culture or landscape design or forestry were not just reporting on the latest discoveries in their respective fields, but were also participating in a larger cultural debate about the appropriate role of expertise in scientific research and in shaping public policy. This debate had profound national consequences, eventually broadening the responsibilities of the federal government and influencing the intellectual contours of modern America.

Contributors to *Garden and Forest*, for example, used the journal to boldly propose a new agenda for political action in the United States. Nowhere was this more evident than in the magazine's advocacy of the emerging science of forestry, of which Sargent was a staunch supporter. Editorials calling for the preservation of the nation's forested estate and editor Stiles' aggressive solicitation of articles by foresters who shared these sympathies established *Garden and Forest* as the voice of those who sought closer federal supervision of public woodlands.

This demand was a tough sell, as its staff and writers recognized: Americans had little interest in federal land management, and no taste at all for the regulation of resource exploitation by a powerful bureaucracy, especially during a period when the Industrial Revolution was consuming vast quantities of timber. To change public opinion, they would have to disseminate counterarguments, a task that *Garden and Forest* supported with evident enthusiasm. In its ten volumes, the journal published an astonishing number of articles related to forestry—more than 450; together, they helped educate a populace that hitherto was ignorant about this science and its social significance.

Europeans, by contrast, knew a lot about the subject, benefitting from political cultures—either monarchical or republican—that assumed considerable power over public and private property: they had long experimented with for-

from THE AXE IN ITS RELATION TO ORNAMENTAL TREES.

IT is a curious fact that Americans, who have destroyed more trees wastefully and foolishly than the people of any other country, and have stood and seen their forests, the envy of the rest of the world, swept away with hardly a voice raised in protest, are more unwilling than other people to use the axe in cases where the cutting of trees is really essential. A hundred square miles of forest may be swept by fire from some mountain range through the carelessness of an idle hunter, a mountain stream may be ruined, and the fertility of a smiling valley threatened. It is all taken as a matter of course, and is looked on as one of those unfortunate occurrences which the community is powerless to prevent. The forests of the national domain are robbed of their timber, and the public is satisfied with the simple acknowledgment of the general government that it has not the power or authority to protect its own property against the organized bands of plunderers who have been preying on it for a quarter of a century or longer. This indifference to trees when they are composing elements of the forest is a marked feature in American character, and is all the more marked from its contrast with our feelings about trees individually, especially trees which we have planted ourselves or have seen planted. When a tree is cut in one of the parks of this city there is a protest raised against the so-called barbarity of the act by a hundred voices which are silent about the destruction of the Adirondack forests. The protest in the one case is as much the result of ignorance and indifference as the silence in the other; and it is as necessary to use the axe, if the beauty and value of ornamental plantations are to be maintained, as it is to save the forests on the headwaters of important streams. . . .

[Editorial. *Garden and Forest* 3 (1890): 545]

est management and had developed professional schools to promote research and educate forest managers. Americans who worried about the rapid disappearance of their forests were encouraged to study European models, first by George Perkins Marsh's pathbreaking *Man and Nature: The Earth as Modified by Human Action* (1864), and later by *Garden and Forest*. In looking eastward, they resembled reformers in other fields who over the next seventy years would participate in a vibrant transatlantic exchange of ideas; these Americans—whether concerned about urban social services or devastated landscapes—

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readily accepted European prescriptions for resolving social ills through governmental intervention.²

Almost every number of *Garden and Forest*, for example, included news from abroad. One squib that editor Stiles inserted announced that a Société des Sylviculteurs de France et des Colonies had been formed "for the purpose of diffusing the knowledge of silviculture and increasing the popular interest in this art." Why bother with such a minor event in France? Because the new organization's ambitions mirrored those of the American magazine's patrons and other readers. Stiles also made space for lengthy reviews of books that described the latest European advances in forestry science and devoted many columns to enthusiastic firsthand accounts of tours of forests in Russia and Italy, England, Germany, and France. Priority was given, however, to learned assessments of the transferability of the European experience to the New World. One of those who so argued was Gifford Pinchot, who while studying at L'École nationale forestière in Nancy, France, wrote a series of articles on European forestry for *Garden and Forest*. In one that compared various governmental forestry systems in Europe, he pointed out that the "principles which underlie not only German, but all rational forest-management, are true all the world over," Gifford Pinchot observed, "but the methods into which the same principles have developed are as widely dissimilar as the countries in which they are being applied." That being the case, there was one European country that "may best claim our attention"—Switzerland. Its "history of forestry . . . is of peculiar interest to the people of the United States," he suggested, "because in its beginnings may be traced many of the characteristics of the situation here and now, and because the Swiss, like the Americans, were confronted by the problem of a concrete forest-policy extending over the various states of a common union."³

Other authors reached similar conclusions, and like Pinchot exemplified the opportunities inherent in cross-cultural fertilization: Carl A. Schenck, a German-born and -trained forester who managed George Vanderbilt's vast forests at Biltmore, North Carolina, also established the first American forestry school there in 1898; that same year Bernard Fernow, his countryman, became the first head of Cornell's School of Forestry after serving as the third chief of the U.S. Bureau of Forestry from 1886 to 1898. Pinchot, along with his family, underwrote the Yale School of Forestry in 1900. Throughout their careers as foresters and educators, each man was sensitive to the difficulty of importing cultural institutions,

but each knew that the development of forest management in America would initially depend on European ideas.⁴

Fernow and Pinchot in particular beat the drum for an augmented governmental presence on public lands, a position that Sargent seconded strongly in his editorial campaign for forest reservations. Moreover, their writings had educational value for a growing cadre of professional foresters that was just beginning to carve out a distinct niche within the field of landscape management. "If I say that forestry has nothing whatsoever to do with the planting of road-side trees, that parks and gardens are foreign to its nature . . . that scenery is altogether outside its province," Pinchot asserted in *Garden and Forest* in 1895, "I am making a conservative statement with which every forester will agree." Its connections with "arboriculture and landscape art" derive from the fact that "it employs to a certain extent the same raw material . . . but applies it to a wholly different purpose." American foresters, like their European counterparts before them, were staking out their turf.⁵

This assertion of professional specialization, when linked to the slow but significant growth of public support for an increased federal intervention in forestry management, was invaluable in developing a political movement devoted to conserving natural resources. It is of lasting significance that this new ethos of conservation, which would dominate early twentieth-century political discourse in America, found its first sustained and vivid expression in *Garden and Forest*.

Endnotes

¹ S. B. Sutton, *Charles Sprague Sargent and the Arnold Arboretum* (Cambridge: Harvard University Press, 1970), 131-133.

² George Perkins Marsh, *Man and Nature: The Earth as Modified by Human Action* (New York: Charles Scribner, 1864); Donald J. Pisani, "Forests and Conservation, 1865-1890," in Char Miller, ed., *American Forests: Nature, Culture, and Politics*,

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(Lawrence: University Press of Kansas, 1997), 15-34; Daniel T. Rogers, *Atlantic Crossings: Social Politics in a Progressive Age* (Cambridge: Harvard University Press, 1998); Char Miller, "Wooden Politics: Bernhard Fernow and the Quest for a National Forest Policy, 1876-1898," in Harold K. Steen, ed., *The Origins of the National Forests* (Durham: Forest History Society, 1992), 287-301.

³ *Garden and Forest* (hereafter, *G&F*) 4 (1891): 22.

⁴ *G&F* 10 (1897): 397; 8 (1895): 319; Carl A. Schenck, "Private and Public Forestry," *G&F* 10 (1897): 232-233, 242-243, 252, 262; Bernard Fernow, "European Forest Management," *G&F* 1 (1888): 454-455; "Why We Need Skilled Foresters," *G&F* 8 (1895): 131; Gifford Pinchot, "The Forest," *G&F* 3 (1890): 374, 386; "Forest-policy Abroad," 4 (1891): 8-9.

⁵ Char Miller and James G. Lewis, "A Contested Past: Forestry Education in the United States, 1898-1998," *Journal of Forestry* 97 (1999): 38-43; Gifford Pinchot, "The Need for Forest Schools in America," *G&F* 8 (1895): 298. Sargent and Pinchot publicly disagreed on one aspect of the professionalization of forestry, namely, the use of military officers as forest guards on the nation's forests. Sargent favored training military officers in the principles of forestry, while Pinchot believed that only a professional civilian service was appropriate. *G&F* 3 (1890): 581; 3 (1891): 9; 4 (1891): 150; 9; 4 (1891): 34-5. As intense as their disagreements would become, they were convinced that the federal government must patrol these valuable public lands; their care could not be left to the states or corporations.

Acknowledgment

I am grateful to James G. Lewis for his research assistance on this project.

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WANTED, A TRACT ON FORESTRY.

To the Editor of GARDEN AND FOREST:

Sir.—The necessity of forestry reform is admitted by all intelligent people who take time to examine the question, but no reform can make much headway until the people at large become convinced of its necessity. The prime need, then, in every such cause is to instruct them as quickly as possible in that which so greatly concerns their welfare.

The two great avenues to the human mind are through the eye and the ear, and of these the first is, no doubt, the most important. That which we see makes, on the whole, the greatest impression. Such object-lessons, therefore, as that contemplated by the Adirondack League Club, referred to in your issue of February 18th, will, of course, be a vast help in forming a healthy public opinion concerning the management of our national forests. The fine example of the city of Lynn [Massachusetts], which is now engaged in acquiring a vast and varied tract of adjacent woodland, embracing some 1,400 acres, to be held as a public forest and park for the use of the people forever, is another splendid object-lesson; the enterprise of the little village of Freedonia, New York, which has had the wit to seize the park idea by the right handle and forestall the future by boldly laying out two parks in the very heart of the town. These and other similar examples help along the causes with which they may severally be classified far more rapidly than can the very best of preaching. May such tangible teaching increase.

Yet there is a large and important work to be accomplished through the "foolishness of preaching." The press has done and is doing much. Still it occurs to me that there is need of, or at least room for, special work through such tracts as that one which assisted the great reboisement of certain districts of France. There, the forests having disappeared through heedless cutting, and the turf been gradually destroyed by the sharp hoofs and the hungry gnawing of the flocks, great and increasing damage from floods began to overwhelm the valleys. To reclothe the heights and restore the equilibrium was found to be impossible until the people—the peasantry who had votes—had been won over. A prize was offered for the best short work adapted to teaching them these lessons, the little book "Studies of Master Peter" being the successful competitor. Some similar work, all the better if shorter, which could be widely disseminated among our rural populations would, I am confident, accomplish much toward producing a right popular view of the vast forest-interests of our land. Who will write one?

Dorchester, Mass.

S.

(Mr. B. E. Fernow, Chief of the Forestry Department at Washington, has already written some leaflets for general distribution, but we cannot have too many of them nor have them prepared from too many points of view.—ED.)

[*Garden and Forest* 4 (1891): 106]

VALUE OF MOUNTAIN FORESTS.

THE first and most important function of mountain forests is the preservation of the mountains themselves by clothing them with soil. The relation of mountain forests to the soil out of which they grow is curious and interesting. The soil now produces the trees, but the forest has produced the soil which now nourishes it. There was a time when there was no soil on the mountains of New Hampshire, nor on any portion of the Appalachian System—when the mountains were only ridges, slopes and summits of bare rock. They were composed wholly of mineral substances, of matter entirely inert and incapable of supplying food to vegetable organisms. There was not an atom of soil on the rocks of the whole region, and no vegetable growth of any kind. Then when conditions permitted, Nature began a new order of things here with some of the lowest forms of vegetable life, resembling the lichens of our time. Some of these could grow here and there on the rocks, and whatever could grow would die and decay, but would not wholly perish. Some slight particles of its fibre or substance would remain undestroyed through all the changes of decomposition, and in the course of centuries or thousands of years a thin film of soil was accumulated here and there sufficient to nourish vegetation of a little higher character and organization than had belonged to the pioneer organisms.

How great the distance from that far beginning to the first trees! And very poor and inferior trees the earliest ones were, when they did appear, compared with those which make our forests now; but they were the best that the still scanty soil would sustain. Ever since the leaves of the first trees began to fall the trees have been slowly adding to the deposit of soil which now covers the rocks, and which has reached the depth and productive potency required to sustain the noble forests of our own time.

The great stratum of fertile, life-producing soil which now lies folded around the shoulders of the hills is the result and accumulation of patient ages of dendral toil. Nature has wrought incessantly, through mighty cycles of time, to clothe the desert rocks with life and beauty, and in the untainted air of these lofty slopes and plateaus she now grows forests which are like the columned aisles of vast cathedrals. Ships which cleave the waves of every sea, and the cottages and palaces of mighty cities, with myriads of structures for man's varied industries, have been builded of the materials supplied by our mountain forests. The superior quality of the timber now grown, and the vast quantities in which it is produced, are effects of the wonderful fertility which the soil has attained. It is richer than ever before, but it has not reached the limit of possible productiveness. There is no such limit, indeed, and if our mountain forests were rightly managed they would forever increase in fertility and the quality of their timber would be thereby gradually improved.

A forest is the only crop, so far as I know, which can be produced perpetually on the same ground without diminishing in any degree the fertility of the soil. It is a remarkable fact that a forest not only does not impoverish the soil out of which it grows, but that it actually enriches it. As the soil is thus improved it responds by producing superior timber. A mountain forest would yield better timber, and more of it, at the end of a thousand years of proper management than at the beginning and proper management means and includes the cutting of every tree when it reaches its best estate.

FARMING IN MOUNTAIN REGIONS.

The entire effort at farming in mountain forest-regions in this country is often a most destructive and suicidal mistake. Much of the ground that has been cleared for cultivation in such regions is so steep that if forest-conditions are once destroyed upon it the soil is certain to be washed away. It has always been manifest to intelligent observers that such land is suited to the perpetual production of timber, and of that crop alone. In many instances in our state land has been cleared and "farmed" with very slight returns which would be much more valuable than it now is if it were still clothed with forest. The yield of farm products in such cases is scanty and uncertain. In some places the land is too high and cold for successful cultivation. There are frosts late in spring and early in autumn, and sometimes in every month of the brief summer, and the soil is soon exhausted. It would be difficult to find anywhere an instance of more obvious natural adaptation to a particular function than our whole mountain forest-region exhibits in its fitness for permanent beneficial use after forest-conditions have been fully destroyed. It would have been much better if some of our "abandoned farms" had never been cleared. In some parts of our country vast values have been permanently blotted out by clearing and cultivating mountain land, and those states will be poorer for all time to come by reason of the resulting destruction and removal of the soil of considerable areas of their mountain regions.

RUIN BY FIRE.

The most fatal agency in destroying the soil of a mountain forest-country, and in wrecking the mountains themselves, is that of fire, and in the history of most mountain forest-regions the operation of this agency has been closely connected with the attempts to cultivate the soil to which I have just referred. In various regions of the Appalachian mountain system many of the farms have been cleared simply by burning the timber and brush left on a tract after it has been lumbered over, and the first crop is planted in the ashes. In a few years the soil is exhausted or washed away, and the farmer goes a little farther up or down the valley, or across the stream which runs through it, and repeats the operation. But the injury to the mountains which is caused by the destruction of the soil of these limited tracts which have been cleared for cultivation is trivial when compared with the losses which have resulted from the forest-fires having their origin in these clearings.

When we consider the rapidly increasing density of the population of our country, and the great advance in the value of all fertile lands, especially in the eastern states, it is obvious that the complete destruction of the soil of any considerable area is a very serious matter. There are few kinds of losses or misfortunes affecting property which are so calamitous as this. It is a crime against posterity, a permanent subtraction from the wealth and the capabilities of the country. The soil is, to a very great extent, the country itself. A burned city can be rebuilt, and the system of insurance distributes the loss widely. But there is no insurance on the soil of our mountain forests, and when it is once thoroughly burned it will require mighty cycles of time to restore it. Its producing capacity for ages, and all the "promise and potency" of a perpetual succession of valuable crops, are at once reduced to nothingness.

—From the Report of J. B. Harrison, Commissioner of Forests for New Hampshire [*Garden and Forest* 3 (1890): 613–614]



A NEW JERSEY PINE FOREST.

THE illustration upon page 164 represents a pure forest of Pitch Pine (*Pinus rigida*) in Ocean County, New Jersey. It is situated about twelve miles from the sea coast, and forms a part of the extensive and interesting domain which surrounds the Laurel House at Lakewood, to the proprietors of which establishment it belongs.

This forest is interesting from several points of view. It is extremely picturesque and beautiful. It occupies ground which only fifty years ago was employed for farming purposes; and it is one of few forests composed of a single species of tree which can be seen in the Northern States, where a number of different trees are usually associated together in forest growth. The Pines in this Lakewood

forest have an average height of fifty feet; and their trunks an average diameter of ten inches. They stand so close together that grasses and undershrubs cannot survive in their dense unbroken shade. The forest floor is deeply carpeted with moss, however, and altogether this forest reminds one more of one of the planted Pine forests of northern Europe than anything we remember to have seen before in the United States. The rapid and vigorous growth of this young forest upon poor and comparatively worthless lands shows, moreover—and this is its chief interest—the way such lands along the Atlantic seaboard, north of Virginia, can be used to the best advantage. And finally it illustrates the possibility of protecting, by means of a little trouble and foresight, such forests from burning up in the fires which annually rage, unchecked, over great tracts in the New Jersey coast region. . . .

The Pitch Pine is not one of the most valuable Pine trees of the United States. Its wood is coarse grained, full of resin, and not very strong. . . . Before southern pine was brought to this market the pitch pine of New Jersey was the only available material in many parts of the State for timbers and flooring; and there are still houses in some counties where floors and floor-timbers are known to have been in constant use for more than a century. But it is for firewood and for charcoal that the pitch pine is most valuable; and the nearness and accessibility of these New Jersey Pine forests to great centres of population give them special importance as sources of fuel supply, which no other forests of this character in the country possess. Much land within three or four hours by rail of this city and of Philadelphia, now utterly unproductive and rapidly deteriorating through the fires which sweep over it every year, can be made highly productive and profitable by means of the Pitch Pine. People who own land of this character will see much to interest and instruct them in these Lakewood forests, and in those in the town of Orleans, on Cape Cod, in Massachusetts.

C.S.S[argent]

[*Garden and Forest* 1 (1888): 166]

THE SIHLWALD.—I.

IT was my good fortune recently to pass a month in the Sihlwald, as that portion of the forest-property of the City of Zurich is called, which stretches for some five miles along the narrow valley of the Sihl. It is not often that a forest is so favorably situated both geographically and as to the conditions which determine the value and fertility of timber-lands; and while there are many peculiarities in its management which mark it as distinct from the great body of European forests, it exhibits so full a knowledge of forestry applied to such excellent conditions and so admirable an adaptation of means to ends, that if it fails of being typical of that which is, it may assuredly challenge attention as the illustration of that which ought to be. Further, since during the last fiscal year it yielded to the city a net revenue of more than eight dollars per acre, a short account of it may serve to emphasize the fact, so often lost sight of, that the protection of forests is not an end, but a means, and that the whole question of forestry has a very definite and important financial bearing. It has, therefore, seemed that a few words upon the Sihlwald might not be without interest to the readers

of GARDEN AND FOREST, and I purpose, after describing it briefly in the present paper, and sketching the management of the forest in a second, to touch upon it in a final one as a piece of municipal property . . . That precious condition of the surface which the French and German unite in describing as "forest-soil," so slow in forming and so quick to disappear wherever the full sunlight is allowed to reach the ground, has here been produced in perfection by centuries of forest-growth. It is perhaps to this factor, next to the abundance of humidity, that the high annual yield of wood in the Sihlwald is due.

The growth which covers the soil thus fortunately suited to its needs is a mixed high or seedling forest, in which the deciduous trees largely predominate. Under the law of the rotation of forest-crops, not so well known as that which determines an analogous success in agriculture because it acts over vastly longer periods, the character of the mixture has undergone a gradual change, until, in the course of two centuries and a half, the percentage of coniferous trees has declined from sixty-one to fourteen, and the deciduous forest has taken their place. . . .

Scattered along between this forest and the Sihl . . . are placed the saw-mill, handle factory and injection plant, whose presence as integral parts of the equipment of the forest, chiefly distinguishes the management of the Sihlwald from that of other similarly situated European woodlands.

THE SIHLWALD.—II.

IN the organization of a normally stocked forest the object of first importance is the cutting each year of an amount of timber equal to the total annual increase over the whole area, and no more. It is further desirable in any long settled community that the forests be so managed as to yield a measurably constant return in material. Otherwise difficulties in the supply of labor and the disposal of the produce make themselves felt, and the value of the forest to its owner tends to decrease. This is especially true in the case of the Sihlwald, whose mills derive their raw material exclusively from the forest to which they belong, and whose supply of labor is limited to the men whom it furnishes with steady employment. Either excess or deficit in the annual production implies loss.

In order to attain this steadiness of yield it is obviously necessary that a certain number of trees become fit to cut each year. The Sihlwald has accordingly been so "organized" that areas of equal productive capacity are covered by stocks of every age, from last year's seedling to the mature tree. . . . The working plan for the Lower Sihlwald, then, prescribes for the forest . . . the operations of what Dr. Schlich has called in his *Manual of Forestry* "The Shelter-wood Compartment System." It may not be without interest to follow the life history of a compartment in which this system is carried out.

After the mature trees had been felled and removed from the area which furnished the yield of the Lower Sihlwald last year the thick crop of seedlings which had grown up under their shelter was finally exposed to the full influence of the light and air. The felling and rough shaping of the timber, the piling of logs and cord-wood and the trampling of the men had combined with the crisis of exposure to destroy the new crop in places and create a few small blanks. Here, as



View in the Sihlwald

soon as the disappearance of the snow had made it possible, groups of the kinds of seedlings necessary to preserve the mixture or destined to increase the proportion of the more valuable species were planted. The operation, necessarily an expensive one, is justified by the greater resistance of a mixed forest to nearly all the calamities which may befall standing timber. Simultaneously with the planting the Willows, Hazels and other worthless species were destroyed, as well as the "pre-existing seedlings," whose larger growth, according to the disputed theory held at the Sihlwald, would damage their younger neighbors more by their shade than their greater volume would increase the final yield of timber. The incipient forest, then, practically uniform in age and size and broken by no blanks which the growth of a year or two will not conceal, is fairly started on the course of healthy development, which it is to continue undisturbed until it reaches the age of fifteen years.

At this point occurs the first of a series of thinnings which follow each other at intervals of seven or eight years, until the trees have entered the last third of their existence. There is, perhaps, no silvicultural question more in dispute than this of the time and degree of thinning which will yield the best results in quality and quantity of timber. The method pursued at the Sihlwald, consecrated by habit and success, gives ample space for the healthy development of the crown from a very early age without admitting light enough through the leaf-canopy to sustain an undergrowth until the trees are nearly ready to give place to their descendants. Such shrubs or seedlings as still appear, thanks to a shade-bearing

temperament, are systematically cut out. It may be strongly doubted whether such a policy might safely be applied on soil less moist than that of the Sihlwald; but here, at least, the trees reach the age of sixty years, tall, straight, clean-boled, and in condition to make the best of the last part of the period of maximum growth, which a large number of measurements have shown to occur in general between the ages of seventy and ninety years. A heavy thinning now comes to the assistance of the best specimens of growth, and they are left to profit by it until seven years before the date fixed for their fall. Then begin the regeneration cuttings, whose object is to admit through the leaf-canopy an amount of light, varying with the temperament of each species, whose mission is to give vitality to the seedlings which the trees, stimulated themselves by their more favorable situation, now begin to produce in considerable quantities. To this end the light which falls from above has a powerful auxiliary in that which the system of felling each year in a long narrow strip admits from the side, and so admirable is this double method that the time which elapses between the beginning and the end of a regeneration is but half the average for less favored localities. This applies only to the deciduous trees. The time required by the conifers is much longer, and the incomplete regeneration which they furnish is supplemented by planting in the blanks already mentioned. But for the self-sown seedlings of both classes the amount of light is gradually increased, the trees which shelter them are at length wholly removed, and the cycle of growth repeats itself. . . .

Nancy, France.

Gifford Pinchot

[*Garden and Forest* 3 (1890): 374, 386]

from NOTES ON THE FOREST FLORA OF JAPAN.—XXIII.

. . . THE most generally planted timber-tree of Japan is the Saké, *Cryptomeria Japonica*, and its wood is more universally used throughout the empire than that of any other Conifer. It is one of the common trees of temple-gardens and road-side plantations, and, when seen at its best, as in the temple-groves at Nikko or Nara, where it rises to the height of a hundred or a hundred and twenty-five feet, with a tall shaft-like stem tapering abruptly from a broad base, covered with bright cinnamon-red bark and crowned with a regular conical dark green head, it is a beautiful and stately tree which has no rival except in the Sequoias of California. Great planted forests of the *Cryptomeria* appear all over Hondo on broken foot-hills and mountain-slopes up to an elevation of nearly three thousand feet above the sea, low valleys and good soil being usually selected for such plantations, as the trees need protection from high winds. The plantations decrease in size and luxuriance in northern Hondo, and the cultivation of the Saké does not appear to be attempted north of Hakkodate where there is a grove of small trees on the slope of the hill above the town. The wood is coarse-grained, with thick layers of annual growth, dark reddish heart-wood and thick pale sap-wood; it is easily worked, strong and durable, and is employed in all sorts of construction. The bark, which is carefully stripped from the trees when they are cut down, is an important article of commerce and is used to cover the roofs of houses. A large round bunch of branchlets covered with their leaves hung over the door of a shop is the familiar sign of the dealer in saké.



Japan owes much of the beauty of its groves and gardens to the *Cryptomeria*. Nowhere is there a more solemn and impressive group of trees than that which surrounds the temples and tombs at Nikko, and the long avenue of this tree, under which the descendants of Ieyasu traveled from the capital of the Shoguns to do honor at the burial-place of the founder of the Tokugawa dynasty, has not its equal in stately grandeur. This avenue, if the story told of its origin is true, can teach a useful lesson, and carries hope to the heart of the planter of trees who will see in it a monument more lasting than those which men sometimes erect in stone or bronze in the effort to perpetuate the memory of their greatness. When the body of Ieyasu was laid in its last resting-place on the Nikko hills his successor in the Shogunate called upon the Daimios of the empire to send each a stone or bronze lantern to decorate the grounds about the mortuary temples. All complied with the order but one man, who, too poor to send a lantern, offered instead to plant trees beside the road, that visitors to the tomb might be protected from the heat of the sun. The offer was fortunately accepted, and so well was the work done that the poor man's offering surpasses in value a thousand-fold those of all his more fortunate contemporaries.

Something of the beauty of this avenue appears in the illustration, although, without the aid of colors, it is impossible to give an idea of the beauty of the *Cryptomeria*. The planted avenue extends practically all the way from Tokyo to Nikko, but it is only when the road reaches the foot-hills that it passes between

rows of *Cryptomerias*, the lower part being planted, as is the case with the other great highways of Japan, with Pine-trees; nor, as it has often been stated, is this avenue continuous, for whenever a village occurs or a roadside tea-house, which are scattered all along the road, there is a break in the row of trees, and it is only in some particular spots that a long view of continuous trees is obtained. The railroad, which follows parallel and close to the avenue for a considerable distance and then crosses it just before the Nikko station is reached, is a serious injury to it. The trees, as will be seen in the illustration, are planted on high banks made by throwing up the surface-soil from the roadway; they are usually planted in double rows, and often so close together that sometimes two or three trees have grown together by a process of natural grafting. Young trees are constantly put in to fill gaps, and every care apparently is taken to preserve and protect the plantation. How many of the trees originally planted when the avenue was first laid out in the beginning of the seventeenth century are left it is impossible to say, but I suspect that most of those now standing are of much later date. One of the trees close to the upper end of the road which had been injured by fire was cut down during our visit to Nikko. The stump, breast-high above the ground, measured four feet inside the bark, and showed only one hundred and five layers of annual growth. Few of the trees in the avenue were much larger than this, although in the neighborhood of the temples there are a few which girth over twenty feet; these were probably planted when the grounds were first laid out.

The two [most valuable timber-trees in Japan], *Chamæcyparis* and the *Cryptomeria*, are now almost unknown in a wild state. They may, perhaps, be found growing naturally on some of the southern mountains which we did not visit; wherever we went, however, we saw only trees that had been planted by man, although some of the plantations had evidently lived through several centuries.

C.S.S[argent]

[*Garden and Forest* 6 (1893): 443]

A MUSEUM SPECIMEN OF *SEQUOIA GIGANTEA*.

A section of a trunk of one of the California Big Trees is now almost ready to be set up in the Jesup collection of American woods in the Museum of Natural History in this city. Like the other specimens of this collection, this one is four and a half feet in long, measuring with the grain, but it is rather more than twenty feet in diameter, and when fully prepared the great wheel will be set up on its rim as the beautiful specimen of Redwood is near by. The tree grew on land now owned by the King's River Lumber Company, near Sequoia, Fresno County, California, a long day's ride up the mountain from Visalia. To make transportation possible it was split into twelve sections, the centre-piece being round, and eleven other radiating from it. It is an admirable specimen, with perfect grain and apparently no wind-checks, although through one of the sections there is a narrow decayed tunnel something like eighteen inches long and an inch or two in width. Outside of this, however, the trunk is perfectly solid, and this decay probably came from some injury to the trunk, which may have been bruised by a falling tree; and if we can estimate time by annual rings of growth the accident happened at about the date when the Pilgrims landed at Plymouth. Mr. S. D. Dill,

who has prepared all the specimens for this great exhibition, is now riveting the segments of the giant trunk together with great iron bolts, so that it will be perfectly solid when it is finally ready for its position in the centre of the collection.

The tree from which this trunk section was cut was one of a few trees left standing of a once magnificent Sequoia-grove, and the stumps about it show that their growth was very large, one not far from this tree being forty feet in diameter. The remains of the old mill which has turned these venerable trees into lumber is still there, but other mills are at work cutting from 125,000 to 130,000 feet every day. It may be said that the Converse Basin tract of Sequoias, which belongs to the King's River Lumber Company, is about ten miles back from the place where this tree was cut, and Mr. Moore, the Superintendent of the company, estimates that there is enough of that one kind of timber on the tract to keep these mills running at their present capacity for fifty years. When the trees which stand high up on the slopes of cañons are felled the logs are cut off into proper lengths. They are then blown apart by dynamite into halves, quarters and eighths, and a powerful steam-engine, with a steel cable, draws this split timber down to a greased tramway of round peeled logs, over which they are shot away to the mill, near the mouth of the cañon. They are then sawed up into lumber of



Stump of *Sequoia gigantea* on land of the King's River Lumber Company

proper sizes and floated down through a V-shaped flume from the mill to the railroad, sixty-two miles away. This flume is supplied by a large reservoir in the mountains. Although when dry the Sequoia is one of the lightest of American woods, it is very heavy when full of sap, and will not float readily until it is seasoned, so that the timber needs to lie some time before it is floated out of the mountain. The lumber looks very much like redwood, and is sold under this name. Indeed, it is only distinguished from redwood by the eye of an expert.

This particular tree was called "Mark Twain," and girthed sixty-two feet at eight feet from the ground and ninety feet at the surface. It was a straight, handsome tree some three hundred feet high, and without a limb for about two hundred feet from the ground. Mr. Moore estimated that it contained four hundred thousand feet of lumber, and the specimen cut, four and a half feet long, weighed over thirty tons. It took two men about three weeks to cut it down. The axemen chopped out deep notches on the opposite sides of the tree, leaving a comparatively narrow strip through the centre untouched. A notch was then cut at one end of this centre-piece on the side toward which the tree was to fall . . . Two long cross-cut saws were then welded together and the workmen began to saw in horizontally opposite the cut last mentioned, and wedges were driven in until the tree toppled over . . . [The illustration] gives some idea of the size of the tree at the ground. Fifty men of the Lumber Company's force are here seen standing out on the sap-wood and bark of the stump, and the tools with which the giant was overthrown lie in the centre, where there is easily room for a hundred more men. Of course, the butt of the log that fell was sawn off above the bevel made by the axes, and in a plane perpendicular to the axis of the log, so that the bottom of the specimen in the museum represents a cut about ten feet from the ground. A section of the log next above this has been secured as a specimen for the British Museum.

Every lover of nature must be rejoiced at the fact that the National Government has taken possession of several of the most extensive groves of Big Trees that remain in California, so that they cannot pass into private hands and be turned into lumber, a fate which has already befallen so many of these oldest and noblest inhabitants of our mountain forests.

[Editorial. *Garden and Forest* 5 (1892): 541-542]

THE FORESTS OF THE NATIONAL DOMAIN.

THE small company of forward-looking people who, in the face of almost universal apathy, had been for years urging the necessity of some rational system of management for the forests on our national domain, felt greatly encouraged ten years ago when President Arthur was moved to mention the subject in one of his annual messages. We have no systematic forest-policy yet, not even the beginning of such a policy, but we are no longer surprised or unduly elated over the fact that men in places of high authority consider the matter worth talking about, at least. President Cleveland, like his immediate predecessors, in his message to Congress, which assembled last month, strongly advised that some adequate protection should be provided for the areas of forest which had been reserved by proclamation, and he also recommended the adoption of

some comprehensive scheme of forest-management. He condemned the present policy of the Government of surrendering for small considerations immense tracts of timber-land which ought to be reserved as permanent sources of timber-supply, and urged the prompt abandonment of this wasteful policy for a conservative one, which should recognize in a practical way the importance of our forest-inheritance as a vital element of the national prosperity.

The House of Representatives, too, has taken prompt action upon Mr. McRae's bill, entitled, An Act to Protect Public Forest Reservations. The provisions of the bill are simple. It authorizes the employment of the army to patrol these reservations, as has been done effectively in the Yellowstone Park and in the Yosemite Valley, and it empowers the Secretary of the Interior to make regulations in regard to their occupancy, to utilize the timber of commercial value they contain, and to preserve the forest-cover from destruction. It also empowers the Secretary of the Interior to cut and sell timber on non-reserved lands under the same rules as those made for the forest reservations, provided that it shall be first shown that such cuttings shall not be injurious to the public interests. The bill had some unfortunate features, but any system which regulates the use of public timber is better than the indiscriminate plunder that has been going on hitherto, and the authorization to use the military for protective purposes is altogether commendable. The bill was amended, however, to strike out, if we understand it correctly, the provisions relating to non-reserved lands, and it restricts the sale of timber on the reservations to trees that are dead or mature, thus limiting skilled forest practice, instead of authorizing trained foresters to make their own selection, and, worse than all, it grants free supplies of timber from the reservations to miners and settlers.

It is to be hoped that when this measure comes before the Senate that its original features will be restored. In its present form it does little more than to expose the timber on the reservations to new dangers. . . . If military protection is assured, that is one step forward, but if such protection is made possible only when the War Department shall consider it worth while, it is a very short step, indeed. No doubt, any measure which gives the assurance of efficient policing of the reservations, or efficiently controls the cutting of public timber, is to that extent a gain, but we certainly want something more definite and decisive than the McRae bill as it now stands. . . .

[*Garden and Forest* 8 (1895): 1]

WHAT is to be the fate of forests on the national domain, and how is the much larger forest area of the country, now in private hands, to be managed in the future, are questions which, a few years ago, would have excited but trifling interest anywhere in the United States. The current issue of *The Century* magazine shows that these matters are now subjects of serious study by many thoughtful Americans. The editor of a great periodical is a good judge of what subjects are of immediate popular interest, and the fact that *The Century* not only makes a distinct proposition of its own for action in the matter of forest-preservation, but devotes ten pages to setting forth the views of persons who, from their official standing or personal knowledge, are qualified to say something

GARDEN AND FOREST

A JOURNAL OF HORTICULTURE
LANDSCAPE ART AND FORESTRY

JANUARY 30 1895

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The February "Century,"

READY FRIDAY, FEBRUARY 1st,

WILL CONTAIN

A SYMPOSIUM ON

Prof. Sargent's Scheme of Forest Preservation by Military Control,

CONTRIBUTED BY

Edward A. Bowers,
U. S. Asst. Commissioner of Public Lands.

B. E. Fernow,
Chief of Division of Forestry,
Dept. of Agriculture.

J. T. Rothrock,
Pres. Penna. State Forest Commission.

Frederick Law Olmsted.
Verplanck Colvin,
Supt. Adirondack Survey.

Theodore Roosevelt.
Gifford Pinchot.

N. S. Shaler.

D. M. Riordan,
Pres. Arizona Lumber and Timber Co.

John Muir.

Cleveland Abbe,
Prof. of Meteorology, U. S. Weather Bureau.

William J. Palmer.

George S. Anderson, Captain U. S. A., in charge of Yellowstone National Park.

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worth hearing on the subject, is an evidence that we are gradually nearing the time when indifference and lethargy in relation to this matter will give place to an active realization of the fact that the prosperity of our country is directly connected with the proper management of our forests.

Six years ago, when speaking of the nation's forests, it was urged in this journal that all forest-lands belonging to the Government should be withheld from sale until an examination of these lands, and of the agricultural lands depending upon them for water-supply, would show what tracts of timber could be put upon the market without threatening important interests in the country below them. For the protection of these forests against injury from man and beast, it was advised that, pending this investigation, the guardianship of the forests on the national domain should be entrusted to the United States Army and that this examination of the national forests should be conducted by a commission, appointed by the President, of men able to report upon the magnitude and quality of our forests, and upon their relations to other interests. No commission was appointed, however; perhaps the time was not ripe for such a plan, modest and moderate as it was; but certainly if such a commission had then been named, we should now know more about our forests than we do. In *The Century* symposium a man so well qualified to speak as Mr. Bowers, the Assistant Commissioner of Public Lands, declares that estimates of the amount of forest-land owned by the Government vary between the lowest and the highest by twenty millions of acres, which means that we have no absolute knowledge whatever. And since no one can do more than make a rough guess at the area of these lands, any surmise as to the amount of timber growing on any portion of them, or of its value, or of the ease or difficulty with which these woodlands can be made permanently productive, would be wilder still. It seems, then, that the need of a board of investigation is quite as urgent to-day as it was when the proposition was first made . . .

There seems to be little question as to the advisability of employing the army as a police force while this investigation goes on. Captain Anderson, who has been in command of the troops in the Yellowstone National Park, ought to be a competent judge in this matter, and in his contribution to the symposium it is stated that the soldiers of his command have served every purpose of a forest-guard most satisfactorily. . . . Of course, this service would only be temporary, for the time is coming when a policy, which only means mere protection of the woods from timber thieves and browsing animals and fire, must be replaced by an active system of reproductive management such as is used in other industries of this country and in the forests of other civilized nations.

[Editorial. *Garden and Forest* 8 (1895): 51]

Old trees in their living state are the only things that money cannot command. Rivers leave their beds, run into cities and traverse mountains for it; obelisks and arches, palaces and temples, amphitheatres and pyramids rise up like exhalations at its bidding; even the free spirit of man, the only thing great on earth, crouches and cowers in its presence. It passes away and vanishes before venerable trees.

—Walter Savage Landor.

NOTES.

An old legend traces the origin of the Thistle as the emblem of the Scottish kingdom to the far-away time when the Danes were invading the country. On a dark night, runs the story, as they were advancing to attack an encampment of Scots, one of them trod on a Thistle, and the thoughtless exclamation which followed awakened the slumberers, who, springing to arms, defeated their assailants. In gratitude for this deliverance the flower of the Thistle was adopted as the national emblem. [8(1895): 300]

In the Bulletin of the United States National Museum, No. 39, Dr. Frederick D. Coville, botanist of the Department of Agriculture, has recently printed some clear directions for collecting specimens of plants and information illustrating their aboriginal uses, which will be found useful to both travelers and settlers who have an opportunity to observe the habits of any of the tribes of American Indians. [8(1895): 300]

The Hard Maple of Maine furnishes a large part of the material used in the manufacture of shoe-pegs, although the wood of the Canoe Birch is sometimes used for this purpose. Shoe-pegs are sold by the bushel, and now range from seventy-five cents to one dollar a bushel, \$150,000 having been received, it is stated by a correspondent of *The Manufacturer and Builder* of this city, last year by the Maine shoe-peg factories. [5(1892): 228]

The destruction of the forests which has been going on about the diamond mines near Kimberley, South Africa, is believed by Dr. William Crookes to have seriously modified the climate. The country within a radius of a hundred miles has been stripped of wood to supply timber for the mines. The forests were barriers against the wind; they tempered the heat of the sun in a region where the air is extremely dry, and their removal is thought to account for the dust storms which have been so frequent in that country this year. [10(1897): 249-250]

Professor Roberts, of Cornell University, is sending out circulars to notify whom it may concern that under the Agricultural Extension Bill the college of agriculture of that university has undertaken to assist, free of expense, all teachers who wish to introduce what is called "nature studies" into the public schools. Nature study means nothing more than seeing familiar things in a new light, and the Cornell faculty wish to encourage the investigation of common objects so as to teach accurate observation and the power of clearly expressing what is seen. [10(1897): 150]

Professor McDougal gives some very good reasons in the current number of Appleton's *Popular Science Monthly* for the establishment of a botanical garden in the West Indies, so that tropical plants could be studied

without going to Buitenzorg or some other garden on the other side of the world. A laboratory and garden in the West Indies could be reached from any important city in our country in four or five days, and it would be much more accessible for the European botanist even than are those established among the antipodes. Such a garden would be of direct benefit to a great number of working botanists in America and furnish investigators and graduate students of this country with unequalled facilities for biological research. [9(1896): 510]

A thoroughly useful Farmers' Bulletin of about twenty pages, just issued by the United States Department of Agriculture, is entitled *Washed Soils. How to Prevent and Reclaim Them*. Along the banks of the Ohio and in many portions of the south hundreds of fields have been washed and furrowed beyond the possibility of profitable cultivation. How the destruction of forests has caused these gullies, how to prevent them, and how by cultivation, reforestation and covering up the ground with grass this evil can be checked and cured is plainly set forth in these pages. The illustrations are not artistic, but they are helpful, and the methods of constructing hillside ditches and terraces, the best preparation for forests, with approved methods of planting and caring for them, are all plainly set forth. The statements in this little tract are so truthful, and the deductions so logical and convincing, that every landowner who is not already familiar with them ought to read and consider them. [9(1896): 510]

The *Northwestern Lumberman*, in speaking of the great flood in the Mississippi valley, says that the deluge has so far subsided that lumber will soon begin to move northward again over the overflowed region, but much of it will be unfit for shipment because it has been under water and is covered with silt. This dirt-covered material will all need to be cleaned, and this will involve a vast amount of work and expense. Where the cottonwood has been covered with water it will be practically ruined, as the dirt can hardly be washed out of its fuzzy fibres, and the result of this is seen in the fact that the price of this lumber has advanced one dollar a thousand. Lucky manufacturers whose lumber piles have been above the water will make the most of their advantages, and the effect will be seen in the market for oak and ash as well as for cottonwood. It will be several weeks before logging can proceed in the bottom-lands with the mills restored to running condition. There will be mud everywhere, tramways washed out, bridges and trestles destroyed, so that it will be midsummer before everything can be restored to order, with mills running steadily, and weeks more will elapse before the newly cut lumber is dry enough to ship. [10(1897): 190]

“Master of a Felicitous English Style”: William Augustus Stiles, Editor of *Garden and Forest*

Phyllis Andersen

“When we think of it, we cannot but recognize that few people have written about parks as Stiles wrote. Olmsted and Vaux, yes, and Whately. It was literature they wrote . . . in addition to facts, Stiles had that literary touch, the penetrative, imaginative quality that no horticulturist had whom I have ever known. He claimed nothing original, the writings and sayings of Olmsted and Vaux being his authority, but he illuminated all they had given him with the lambent flame of his literary genius.”—Samuel Parsons Jr., 1926

Charles Sprague Sargent was the self-appointed “conductor” of the nineteenth-century journal *Garden and Forest*.¹ Like all maestros he has been given almost sole credit for the journal’s achievements: its timely reports of horticultural advances, its prescient warnings of threats to forests and scenery, and its unique linking of disciplines. Sargent did have significant expertise in the many fields covered in *Garden and Forest*, but he was less a savant than a manager who knew how to pick a good team. Credit for the graceful prose and for the eloquent advocacy for public parks should go not to Sargent, but to *Garden and Forest*’s editor William Stiles. Stiles, an experienced New York journalist who also enjoyed a distinguished career in public service, was appointed managing editor by the founders of the journal in 1888. The editorial office of *Garden and Forest* was located in the Tribune Building in New York, and Stiles continued in his long-established role of editorial writer for the *New York Tribune* during his tenure as editor of *Garden and Forest*. Sargent “conducted” from his base at the Arnold Arboretum in Boston, where he was director.

Stiles’ role in *Garden and Forest* has not been widely recognized, not because it was intentionally obscured by Sargent, who fully appreciated both his editorial skills and his character, but rather by routine library practice. The full mast-

head of *Garden and Forest* listing staff names and positions, editorial mission, and contributors was positioned in the front of the publication in an advertising section. When the issues were subsequently bound by libraries, the advertising sections were commonly removed as having no future value. Hence the information about Stiles’ role was lost, as well as the advertisements, now recognized as historically significant in their own right. What remained was an abbreviated masthead on the first editorial page listing Charles Sprague Sargent as Conductor. Stiles’ role was further obscured by the fact that most of the lead editorials of the journal, many of them authored by Stiles, were unsigned.

William Augustus Stiles was born in Deckertown (now Sussex), New Jersey, on March 9, 1837. His father, Edward Augustus Stiles, was a mathematician and educator who founded Mount Retirement Seminary, a successful preparatory school in northern New Jersey. His mother was the former Eveline Belmont Howell. William was educated at his father’s school and at Yale, graduating from Yale in 1859. He returned briefly to the Mount Retirement Seminary to teach, but in 1864, hoping that a sea voyage would improve his health, particularly the weak eyesight that was to plague him all of his life, he traveled to California by

way of the Isthmus of Panama. He briefly held a teaching post in Oakland, but soon left to join the corps of engineers laying out the new Union Pacific Railroad line across the Sierra Nevadas. However, his weak eyesight, further strained by detailed mapmaking, forced him to return to his father's farm in New Jersey for a period of recuperation. Having formed an interest in plants during his time in California, Stiles now began a systematic study of plants, collecting in the wild and cultivating nursery stock. Later, his interests expanded to include forestry, agricultural technology, and landscape gardening. He also became interested in local politics during this period and later ran for New Jersey state offices several times. After a brief stint as a gauger (or tax collector) in New York City he began his career in journalism.

Samuel Parsons Jr., landscape architect for the New York City Department of Parks in the 1890s, tells the story of an after-dinner speech Stiles made to a group of Yale alumni in New York in the late 1870s. According to Parsons, Stiles' wit and intelligence so captivated Whitelaw Reid, publisher of the *New York Tribune*, that he engaged Stiles on the spot as an editorial writer for the *Tribune*, a position he was to hold until the end of his life.² In 1883 Stiles also became the agricultural correspondent for the *Philadelphia Weekly Press*, reporting on current research in agricultural methods.

Stiles' early writings for the *Tribune* established him as a thoughtful and knowledgeable spokesman for local issues. ("There was nothing of the superficial smartness of the ordinary newspaper man, but his articles were written in a grave and judicious style, with a fine literary quality."³) He quickly focused on public parks, advocating additions to New York City's parklands and objecting to what he saw as misguided efforts to improve those already established—particularly Central Park.

The early 1880s were a period of significant controversy for Central Park. Like all large public works projects the park had become a rallying point for those seeking quick recognition in local politics. The pent-up frustrations of those not in sympathy with the Olmsted and Vaux design resulted in a questioning of priorities. They questioned the park's dedication to the



William Augustus Stiles (1837–1897)

passive enjoyment of scenery, asking what classes of society were best served by this type of park. Inappropriate intrusions in the form of active recreation facilities and popular amusements were proposed. In his editorials Stiles positioned himself as a staunch defender of the Olmsted-Vaux vision. Frederick Law Olmsted Jr. and Theodora Kimball, in the introduction to their bibliography of works on Central Park in *Forty Years of Landscape Architecture: Central Park*, note the significance of *Garden and Forest's* coverage of park issues: "The history of Central Park during the critical ten-year period covered by *Garden and Forest* (begun in 1888 and edited by friends and warm defenders of the Park) is so well reflected in its pages that perhaps a disproportionate number of references—all to editorials—in this periodical have been here included."⁴

Stiles and Olmsted had a long-standing professional friendship. When Charles Sargent became ill in early 1888, just before the launch of *Garden and Forest*, Olmsted, who had contributed \$500 to the initial financing of the journal, stepped in to offer advice and support to the new editor. The correspondence between Stiles and Olmsted, who had by then relocated to Brookline, Massachusetts, reveals Stiles'

gratitude to Olmsted for his suggestions of topics and authors for the journal. Olmsted, like many others, valued Stiles' views on the transformation of the field of landscape gardening into the profession of landscape architecture. In a letter of advice to his son Fred Jr., Olmsted reflected on his own role and that of others in the emerging profession: "It is as if the war had just begun and my part had been to keep the enemy in check until reinforcements could arrive. These young men, John [Olmsted], Harry [Codman], [Charles] Eliot and [Charles] Coolidge, with Sargent and Stiles and Mrs. Van Rensselaer, are the advance of the reinforcements."⁵

In 1892 Stiles began to use the editorial columns of *Garden and Forest* and the *New York Tribune* to call attention to a proposed speedway through Central Park along its western boundary, a project he felt was totally contrary to Olmsted and Vaux's vision: "[This project] would make an offensive exhibition of the power of money to confiscate for the pleasure of a few rich men the ground which offers to the poor of the city their only opportunity to enjoy the sight of verdant fields."⁶

In 1895 the newly elected mayor of New York, William L. Strong, appointed William Stiles to the Board of Park Commissioners, a politically powerful body with substantial influence over capital expenditures. Shortly after Stiles' appointment, the speedway proposal was resurrected, this time not in Central Park but along the west bank of the Harlem River. An engineering firm was to design it rather than Calvert Vaux, who was then landscape architect for the New York City Parks Department. This was only one of a series of humiliating attacks on Vaux from members of the Park Board who continued to try to discredit him for his participation in stopping the Central Park speedway proposal. Lacking the thick skin so useful to

WILLIAM STILES was assisted at *Garden and Forest* by Mary B. Coulston. Coulston, who wrote the biographical entry for Stiles in Liberty Hyde Bailey's *Cyclopedia of American Horticulture* (1902), is described by Bailey as simply "M. B. Coulston, formerly Assistant Editor of *Garden and Forest* of Ithaca, New York." Coulston wrote a number of signed articles on horticultural subjects for *Garden and Forest*. While little is known of her early career, she figures later as a significant participant in the early planning of Balboa Park in San Diego, California. By 1902, relocated to Livermore, California, Coulston was hired by the San Diego Park Improvement Committee to be its secretary and to write articles for the local newspapers supporting the improvement of San Diego's City Park. She is described by her colleagues as possessing extensive knowledge of parks in the United States and Europe as a result of her position at *Garden and Forest*. She is credited with bringing the New York-based landscape architect Samuel Parsons—a well-known advocate of Olmsted and Vaux's vision for Central Park—to the attention of the San Diego Park Committee, and with helping facilitate his hiring as designer of what was to become Balboa Park. She had apparently been well trained by Stiles, and perhaps Sargent, to define the mission of urban parks as bringing rural scenery to the city. Coulston died in 1904 while attending a summer school session at the University of California at Berkeley. Her friend Kate Sessions, the renowned California horticulturist and garden designer, arranged to have her ashes buried under a cedar of Lebanon tree in Balboa Park. *

* Mary B. Coulston's role in the planning of Balboa Park is described in Richard W. Amero, "Samuel Parsons Finds Xanadu in San Diego," *Journal of San Diego History* 44 (Winter 1998).

those in public service, Vaux suffered under these attacks. He needed a protector, and William Stiles gladly accepted the role, rallying support for Vaux from a significant number of prominent New Yorkers. Vaux's son Bowyer said that Stiles had "perhaps a keener appreciation" of his father's genius than any other citizen.⁷

William Stiles died on October 6, 1897, at the home of his sister Mrs. E. H. Davey. Never married, he had remained close to his two sisters and to the family property in northern New Jersey. In the fulsome style of the period, the obituary notices praised his contributions to the protection of the parks of New York and to the responsibility of government and civic leaders to

serve the needs of the disadvantaged. The memorial notice published in the October 13, 1897, issue of *Garden and Forest*, unsigned but undoubtedly written by Charles Sargent, underscored Stiles' "inflexible purpose":

He has been more, however, than a brilliant and successful editor of a technical journal; keen love of nature and sympathy with the cravings of the poor shut within city walls from the sight and enjoyment of the country made him fully understand the value and true meaning of urban parks, and for twenty years, always with that modesty which was one of his strongest characteristics, but with inflexible purpose, he has stood between the parks of this city and men who at different times and under different pretenses have tried to deface them. . . . His death is a serious loss to the readers of *Garden and Forest* and to every one in the United States interested in landscape-gardening, horticulture and the care and protection of our national and state forests.

Garden and Forest ceased publication in 1898. Despite the high quality of its writing, its appeal to practitioners in many fields, its international interests and noted contributors, the magazine had always run at a loss; Sargent had been covering its deficit for years. But it may have been the loss of Stiles that decided the issue, for Sargent's major responsibility at that time was building the scientific credibility of the Arnold Arboretum. The magazine had been in many ways Sargent's experiment. In addition to reporting on "all progress in science and practice"—horticulture, "garden botany," dendrology, scientific and practical forestry—it deliberately linked these fields with landscape gardening. It even stretched its mission to link landscape gardening with architecture. Stiles' appointment as editor of *Garden and Forest* gave it a lively, stylish prose comparable to that of

NEW DANGERS TO PUBLIC PARKS.

IN praising the man whose recent death means a heavy loss to the readers of this journal, and in noting his long usefulness as the most keen-eyed and devoted defender of the public parks of New York, the daily papers have dwelt forcibly upon the dangers which threaten these parks from the "assaults of the ignorant and vicious." But the parks are threatened by other dangers, newer than these, more subtle and insidious, less easily recognized as dangers, and therefore less likely to be frankly and forcibly resisted. And the consciousness of this fact greatly augments, among those who keep close watch upon our parks, the regret which every intelligent American must have felt when he heard of the death of Mr. Stiles.

The ignorant and the vicious have long been enemies of the parks—persons who deny their utility because it cannot be translated into terms of dollars and cents; those who are eager to injure them for the sake of giving to the city something, advantageous, perhaps, in its own way, which they think of more "practical benefit"; who wish to exploit them for their own profit or who plan to fill them with ugly objects; who barbarously injure their grass, trees, flowers or monuments for their own mischievous pleasure; or who think they know more about caring for them than their professional superintendents, and therefore try to "arouse the public" whenever a dying tree is cut or any other needful and desirable work proposed.

These people represent the unintelligent, uncultivated and unconscientious elements of the population. They are now recognized as enemies of the public, which in some degree is on its guard against them. Teachers, champions and leaders are still needed to defend the parks from their possible attacks. But the public is now easily roused to oppose their worst efforts; and it is probable that no such bold assault upon Central Park will again be attempted as the effort made a few years ago to run a speedway through it, or the equally horrible one to turn part of it into a barren parade-ground. And the public may likewise be counted upon, although not so confidently, to forbid the attempts of individuals to dot it with penny-in-the-slot

machines or newspaper kiosks, or otherwise to disfigure it and to pervert it from its true service for the profit of personal greed under the pretense of supplying special "conveniences" or "pleasures" to its frequenters.

The danger to our pleasure-grounds from engineers necessarily employed upon them, but devoid of the right artistic feeling and unwilling to abide by the counsels of landscape-gardeners, has recently been dwelt upon in these pages and may for the moment be passed by. What we wish now to point out is that it seems probable that more and more schemes to further definitely intellectual or aesthetic ends will be prosecuted without due regard to the integrity and beauty of our parks as works of landscape-art, and that the patrons of science and literature and of art of other kinds are likely to try to injure our great artistic creations like Central and Prospect Parks. And this is, of course, a very insidious danger, as the schemes may be worthy in themselves, and the people who urge them are those whom the public has been told it should trust most implicitly in intellectual and artistic matters.

It is at least a question whether the new Public Library should have been allowed to claim the site of the old reservoir on Fifth Avenue, which otherwise would have been added to the area of Bryant Park. The Metropolitan Museum should not have been given a site within Central Park, but placed beyond its limits, as the Museum of Natural History was upon its western borders. And the stand which Mr. Stiles took, as Park Commissioner, in opposing the desires of the Botanical Society—which, if carried out, will seriously impair the peculiar beauty of Bronx Park and its utility as a public pleasure-ground—must convince all the readers of this journal, who know of his devotion to botany and horticulture and to the task of spreading an interest in them among the people at large, that here, too, a great mistake has been made, and by just the kind of persons who ought to be trustworthy guides with regard to the right conservation of the public's park-lands. . . .

[*Garden and Forest* 10 (1897): 439]

journals of a more general nature: *Century Magazine*, *Putnam's Magazine*, *North American Review*. While there were other magazines devoted to horticulture and garden-making, they were written and edited by horticulturists and nurserymen and lacked the international scope and literary style of *Garden and Forest*. "His mastery of a felicitous English style and his profound and sympathetic knowledge of floral and arboreal life made him one of the most instructive and charming of contemporary writers; with refined taste and sturdy integrity . . ." ⁸

Endnotes

Note on sources: The basic facts of Stiles' life were constructed from the extensive obituary notices published at his death: *New York Tribune*, 7 October 1897; *New York Times*, 7 October 1897; *Garden and Forest*, 13 October 1897. M. S. Coulston's biographical entry on William Stiles in *Liberty Hyde Bailey's Cyclopaedia of American Horticulture*, 1902, was also consulted, as well as correspondence between Stiles and Frederick Law Olmsted from early 1888 (Frederick Law Olmsted Papers, Library of Congress).

¹ *Garden and Forest* was not the first publication to be "conducted"; John Claudius Loudon called himself the "conductor" of *The Gardener's Magazine* (London, 1826–1844).

² Mabel Parsons, ed., *Memories of Samuel Parsons* (New York: Putnam's, 1926), 127.

³ Parsons, 128.

⁴ *Forty Years of Landscape Architecture: Central Park* (New York: Putnam's, 1928), 563.

⁵ Frederick Law Olmsted Sr. to Frederick Law Olmsted Jr., 5 September 1890.

⁶ *Garden and Forest*, 9 March 1892, 109.

⁷ C. Bowyer Vaux to John C. Olmsted, 8 December 1895, quoted in Francis R. Kowsky, *Country, Park, and City: The Architecture of Calvert Vaux* (New York: Oxford University Press, 1998), 319.

⁸ *New York Tribune*, 7 October 1897.

Phyllis Andersen is Director of the Institute for Cultural Landscape Studies of the Arnold Arboretum.

Bernice Giduz Schubert, 1913–2000

It is with an overwhelming sense of loss that we record the death on August 14, 2000, of Bernice Schubert, botanist, editor, colleague, and friend of the Arnold Arboretum, whose career at Harvard encompassed a total of fifty-three years, first at the Gray Herbarium and later at the Arnold Arboretum.

Dr. Schubert was born on October 6, 1913, in Boston. She graduated from the Massachusetts College of Agriculture (now part of the University of Massachusetts, Amherst) in 1935 and earned both an A.M. (1937) and a Ph.D. (1942) from Radcliffe College. She was employed at the Gray Herbarium part time while a student (1936–1941) and later full time (1941–1949), working as a technical assistant in plant taxonomy and, more importantly, as editorial aide to Professor Merritt Fernald, then director of the Gray Herbarium, on his two major works, the eighth edition of *Gray's Manual of Botany* (1951) and *Edible Wild Plants of Eastern North America* (1958), coauthored with Kinsey, plus a decade of individual publications.

When Professor Fernald died, about three months after publication of the *Manual*, Dr. Schubert went to the Jardin Botanique de l'État in Brussels on a Guggenheim fellowship where she worked on Leguminosae of the Belgian Congo and Ruanda Urundi. Upon her return to the United States in November 1952, she was employed in the Plant Introduction Section of the U.S. Department of Agriculture in Beltsville, Maryland. The first phase of her work there involved the taxonomy of North and Central American species of the genus *Dioscorea*. In a second and related phase, she cooperated with chemists of the National Institutes of Health in a search for plants with alkaloids of potential use in treating high blood pressure, collecting samples in Cuba, Puerto Rico, Costa Rica, Panama, Mexico, and Brazil. A summary publication coauthored with J. J. Willaman, "Alkaloid-Bearing Plants and Their

Contained Alkaloids," was issued in 1961 as U.S.D.A. Technical Bulletin 1234.

In the fall of 1962 Dr. Schubert came to the Arnold Arboretum, first as associate curator and later as curator—an unusual appointment for a woman at a time when there were no women on the roster of Harvard's biology department, and when curatorial appointments were the academic equivalent of associate or full professor. In addition to her curatorial work, as senior lecturer she served as advisor to both undergraduate and graduate biology students and, from 1969 through 1975, she was supervisor of the Harvard University Herbaria building, an arduous task with many interruptions and little appreciation. And when my successor as director, Peter Ashton, was delayed by visa problems, she filled in as acting director of the Arboretum in Cambridge from July 1 to September 30, 1978, bridging the gap with her usual competence and outspoken distaste for administrative jobs.

Dr. Schubert's prime responsibility was as editor of the *Journal of the Arnold Arboretum*, a post she filled until 1975, after which she chaired the editorial committee (now known as the joint Arnold Arboretum-Gray Herbarium publication committee). In 1984, to honor both her retirement and her seventieth birthday, the *Journal* staff dedicated number 3 of volume 65 to her. It was said then and can be repeated now that during her tenure as editor, the *Journal* was considered one of the best-edited botanical periodicals of its kind, and she was known to all her authors as a kind editor.

Over the course of her long career, Dr. Schubert received a great deal of recognition. She was honored for her work on the genus *Begonia* with the Eva Kenworthy Gray award of the American Begonia Society and by a Silver Medal of the Massachusetts Horticultural Society. She was an honorary member of the Sociedad Botanica de Mexico and a fellow of the Linnean Society of London. Other memberships

included the Société Royale de Botanique de Belgique; the Washington Academy of Sciences; the American Society of Plant Taxonomists; the International Association of Plant Taxonomy (where she served as secretary of both the Standing Committee on Stabilization and of the Committee on Nomina Ambigua); the American Institute of Biological Sciences; the Botanical Society of America; the New England Botanical Club; and the Society of Economic Botany (where she served on the Council). In 1978 she served on the committee on Desmodieae for the International Legume Conference held at Kew. A full listing of Dr. Schubert's ninety-four publications will be given in *Taxon*. Among them are twenty-nine papers on *Begonia*, nineteen on *Desmodium*, twelve on steroids, eleven on *Dioscorea*, in addition to obituaries, book reviews, and articles on miscellaneous other subjects.

Dr. Schubert welcomed all visitors to the Harvard University Herbaria, offering a tour of the Jamaica Plain collections or of the botanists' graves at Mt. Auburn Cemetery. She often entertained in her apartment, a botanical treasure-house of museum-quality artifacts; the "wooden flowers of El Fortin" were a particular interest. For years her living room was dominated by a full-size loom on which she practiced weaving as a hobby. In her last years she continued to entertain students and professional botanists at restaurants, still exercising her talent for making each guest feel special.

My own sixty-year association with Bernice Schubert began when we were fellow graduate students in the Radcliffe laboratory of the Gray Herbarium and it continued through our years of retirement. I developed a deep respect and appreciation for this remarkable woman whose contributions to the Arboretum and the Her-



baria were unprecedented both in number and variety, and this at a time when the careers of most women in botany were limited to short-term appointments to the *Generic Flora of the Southeastern United States* project or as research fellows, Mercer fellows, herbarium assistants, or, vaguely, as botanists.

Her ashes are buried in Mt. Auburn Cemetery where Asa Gray, Sereno Watson, Merritt L. Fernald, Oakes Ames, Charles Schweinfurth, Reed Rollins, and other former Harvard botanists are interred.

Richard A. Howard

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The Arnold Arboretum

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Arboretum Embarks on Strategic Planning Process

Robert E. Cook, Director

At the millenium, the Arnold Arboretum finds itself at an unusual place in its history. Over the past decade, great improvements have been made in the curation of the living collections and the care of the grounds. The Hunnewell Visitor Center, our main administrative building, has been fully renovated and our other facilities and equipment have been brought to a high state of maintenance. Our staff has grown in size with new programs in education and cultural landscapes, and we continue to mount international expeditions for botanical exploration and collecting. We are about to begin construction on three major landscape projects, the largest of which will create a new collection of sun-loving shrubs and vines in a four-acre garden. Finally, we have successfully completed a fundraising campaign that garnered nearly ten million dollars. This, combined with the remarkable performance of the Harvard Management Company over the past several years, has more than doubled the value of our endowment.

It is, therefore, an ideal time to stop, take a breath, and decide where we would like to go in the next two decades. Several years ago our staff assessed our programs as part of a long-range planning effort. Many of the ideas that surfaced during this process

have taken programmatic form. Some have been more successful than others, and many have broadened the activities of the Arboretum staff beyond a narrow focus on woody plant research and education.

Because of our strong financial and administrative position, it is appropriate that a strategic planning process examine a wide range of options while bringing a critical perspective to the assumptions and constraints that have traditionally governed the operations of the Arboretum. We should determine what our core values are and how these might fuel a set of

ambitious goals for the coming quarter century.

We have concluded that this will require external assistance, and we have identified a consultant, the Technical Development Corporation of Boston, with excellent experience in facilitating critical self-examination and providing guidance on developing long-range plans for nonprofit organizations. We anticipate a process that will begin this fall and yield a final document by May of 2001.

I thank all the friends of the Arboretum whose loyal support and generous contributions have given us this wonderful opportunity.

A Visit to Cuba's Cienfuegos Botanical Garden

Peter Del Tredici, Director of Living Collections

It was my unbelievably good fortune to spend eight days this August at the Cienfuegos Botanical Garden in Cuba. My trip was sponsored by Harvard University's David Rockefeller Center of Latin American Studies, which asked me to evaluate the current condition of the garden and to provide the staff with technical assistance in garden maintenance and plant propagation.

The garden, which in Harvard circles is known as the Atkins Garden, was founded in 1899 as a partnership between a Boston-

based sugarmill owner, Edwin F. Atkins, and Harvard University, in particular, professors George L. Goodale and Oakes Ames. In its early days, the garden was chiefly devoted to studying plants of economic importance (especially sugar cane) and was funded entirely by Atkins. In 1920, he arranged for a long-term lease of the garden to Harvard and established an endowment to fund research in tropical economic botany by Harvard professors and students. As well as being inter-

• *continued on page 2*

ested in economic plants, Atkins was deeply interested in trees and personally supported the development of an arboretum by sending many trees to the garden from nurseries in Florida. At the time of his death in 1926, the arboretum was a well-established part of the garden.

When the garden was founded, it was only eleven acres in size. It grew steadily in size in direct proportion to the Atkins family interest in the project, eventually reaching a maximum of 221 acres in 1938. A small laboratory facility was built in 1924 (which also housed the library) to facilitate the research use of the collections. Harvard continued to operate the garden until 1961, when the Cuban government nationalized the Atkins sugar plantation and mill and took control of the garden. They renamed it the "Cienfuegos Botanical Garden" and placed it under the administration of the Cuban Academy of Sciences.

The first official post-1961 contact between the Cienfuegos Botanical Garden and Harvard University occurred in November of last year, thanks to the concerted efforts of the David Rockefeller Center and members of the Atkins family. Around the time of my visit this past summer, a strong e-mail communication channel made preparations for the trip relatively easy. The current director, Dr. Lazaro Ojeda, was extremely helpful, and the lateness of the hour notwithstanding, was at the garden to greet my wife Susan (who acted as my translator) and me. We lodged in the immaculately maintained "Casa Catalina," a dormitory built in 1938 to house visiting scholars. Planting season was in full swing



Staff of the Cienfuegos Garden.



The former Harvard Biological Laboratory building.

while we were there, so we got to see the garden in all-out operation, including nursery, curatorial, and maintenance functions. Despite a scarcity of resources (especially gasoline), the garden is maintained to a high level, and new plants are being added continuously. The palm collection is particularly impressive with about 267 species in 66 genera growing on the grounds. Also noteworthy are the collections of bamboo, figs, and legumes.

Just as interesting as the collections was our dialogue with the staff on a wide variety of issues

that affect botanical gardens—conservation and education as well as the more traditional topics of maintenance and propagation. My wife and I came away with deep respect for the staff's dedication to their work and with the knowledge that the garden's future will be bright. Indeed, this coming November (perhaps as you are reading this article) the Cienfuegos Garden, in honor of its hundredth anniversary, will be hosting a special international symposium on "Challenges Facing Botanical Gardens in the Twenty-First Century."

Arboretum Holds Oldest *Franklinias*

Pamela Thompson, Adult Education Coordinator

A survey conducted by Historic Bartram's Garden and the John Bartram Association reveals that the two oldest documented franklinia trees in the world, dating from 1905, are growing at the Arnold Arboretum. These trees, known botanically as *Franklinia alatamaha*, are descendants of a tree of Bartram's original collection at Historic Bartram's Garden in Philadelphia, which was given to the Arboretum in 1884 by Philadelphia city councilman Thomas Meehan, a former gardener at Bartram's Garden. Both trees can be found on Chinese Path on Bussey Hill.

In 1998, as part of a tricentennial celebration of botanist and explorer John Bartram, the John Bartram Association launched an international franklinia census to determine how many are growing and where, as well as to locate the oldest specimens. By May of this year, 2,046 franklinias were reported from 35 states and the District of Columbia and 8 foreign countries. In New England, Massachusetts reported 92 specimens; Connecticut has 56; Rhode Island, 15; New Hampshire, 3; Vermont, 2; and Maine, 1.

Although several people reported franklinias thought to be about 100 years old (on New York's Long Island, the Connecticut coastline, and in the Philadelphia area), the Arboretum was able to document the age of its specimens. That any of these trees exist today is due to John Bartram and his son William, who first discovered the plant in the wild in 1765 and had the foresight to propagate the plant for their gar-

den and to distribute cuttings.

The tree has not been found in the wild since 1803.

Beyond dates and locations of trees, the census data create a resource for those wishing to grow franklinia. To determine the optimum growing conditions, the survey requested information on soil, drainage, exposure, and more. The consensus is that franklinias favor a clay soil with excellent drainage, prefer to be situated among other plantings in south-facing locations, and thrive in sun to part shade. Most of the franklinias reported are six to ten feet in height with a trunk circumference of one to five inches. The majority range in age from one to ten years



Kirstin Behn

old. The Arboretum's largest plant is 19.99 feet in height and spread and 10.78 inches in diameter at breast height.

To find out more about the history and availability of the franklinia, visit Historic Bartram's Garden at www.libertynet.org/bartram.



Kirstin Behn

The 2000 Arboretum interns: Standing in rear, Otto Hasilo, Grant Jones, Dino Rossi, Andrew Pulte; seated at center, Alice Kitajima, Phil Kopf, Andrew Maciaszek, Maria Liszkay, Mary Sullivan; front, Virginia Harding, Andrew Heffner, Eva Novoa, Katalin Heja. Not pictured: Sheila Rabideaux.

New on the Institute for Cultural Landscape Studies Website www.icls.harvard.edu/current.htm

The Future of Farming on Protected Landscapes. This edited version of a roundtable held at the Arnold Arboretum profiles discussion participants and their farms, and focuses on preserving the complex social and economic processes that produce farm landscapes:

- **Land, the Most Visible Farm Asset:** Land Protection in a Changing Farm Economy, Preserving Farm Regions, Affordability & Property Rights
- **Farm Operations, the "Work" in "Working Landscapes":** Farmer Recruitment & Farm Finances, New Farm Markets & Products (including environmental quality & education!)
- **Farmers & Nonfarmers:** Farm Neighbors, the Nonfarming Public

Natural Science and Cultural Landscapes. The Institute is looking for ways to tap into relevant work in the natural sciences, particularly ecology. The first items to be posted are talks by Arnold Arboretum director Robert E. Cook:

- Is Landscape Preservation an Oxymoron?
- Do Landscapes Learn? Ecology's "New Paradigm" and Design in Landscape Architecture

The site will also explore the changing ways in which scientists have defined an "ecosystem," the tangled history of the far newer term "ecosystem management," and the broader history of connections (or the lack of them) between science and landscape management.

www.icls.harvard.edu/events.htm

Check this page for upcoming events sponsored by the Institute and others, as well as for readings and publications related to past and upcoming events. Fall 2000 Institute events have included:

- A session on farmland at the Massachusetts statewide historic preservation conference
- A series of field walks and talks called **Reading the Landscape of New England**
- A free public lecture, **Open Space in Boston: Let's Not Suburbanize From Within**

To contact the Institute for Cultural Landscape Studies, please leave a message at 617-524-1718 x175 or email icls@arnarb.harvard.edu.

Letters of Participation Awarded

The Arnold Arboretum offers three letters of participation through the adult education program. These letters provide students with a focus of study and documentation of courses taken at the Arboretum. More information about the letters of participation is located in the Arboretum's catalog of programs and events. Since the fall 1997 issue of *Arnoldia*, a number of people have completed the requirements for letters of participation. Congratulations to each!

Letters of participation have been earned by:

Woody Plant Propagation

Paula Berardi
Robert Cappuccio
Miriam Hawkes
Larry Lee Jones
Susan Lemont

Temperate Woody Plant Materials

Paula Berardi
Robert Cappuccio
Dorick Corbo
Laura Horky
Larry Lee Jones

Historic Landscape Preservation

Linda DesRoches
Terri Rochon
Priscilla Williams
Dale Wilson

New Staff

Michael Dosmann has joined the Arboretum as a Putnam Fellow in the living collections department. His primary responsibilities will be the planting design and selection for the new shrub and vine



garden. He will also participate in various projects on the grounds as well as pursue his own research using the living collections.

Michael received his bachelor of science in public horticulture from Purdue University and his master of science in horticulture from Iowa State University (ISU) in 1996 and 1998, respectively. As the Garden Club of America's Martin McLaren Fellow for 1998–1999, he worked at the Royal Botanic Gardens, Kew, the Royal Botanic Garden Edinburgh, and the school of plant science, University of Reading. He comes to us from ISU's department of horticulture where he was employed as a research assistant. Michael's interests in horticulture and botany span woody plant ecology and systematics, and ornamental plant selection and evaluation. And, like most plantsmen, he keeps his eyes open for the rare, unusual, and interesting.

Karen Pinto's staff assistantship will be shared between the administration department and the



Institute for Cultural Landscape Studies. She comes to us with fourteen years' experience at Harvard, in the Graduate School of Public Health and Medical School; she has also worked in the fields of law and human services.

Nancy Sableski, our new children's education coordinator and a Jamaica Plain neighbor, has



been visiting the Arboretum for over twenty years, often to paint landscapes. She holds a BFA with honors in painting from the Massachusetts College of Art and a master's degree from Simmons College School of Social Work. Nancy became a volunteer school guide in the Arboretum's field studies program in April, 1998; she was later hired as school programs assistant. Most recently, she coordinated the Boston Urban Gardeners' education program. Her volunteer work now involves coordinating the fall "Artists in

the Arboretum" show for Jamaica Plain Open Studios.

Steve Schneider is the Arboretum's apprentice for 2000–2001. This year-long position allows him to rotate through the three areas of the living collections department: curation, greenhouses, and



grounds. Originally from Quincy, Massachusetts, Steve earned his bachelor of science in biology from Northeastern University in May 2000. He is not, however, a new face at the Arboretum: he spent the summer of 1999 working as an intern in the Dana Greenhouses. Since graduation, he has served as adjunct curator of the Northeastern University Herbarium, where he also worked as a student. He aspires to a career in a botanical garden as horticultural therapist.

Two new faces are serving our visitors at the Arboretum's front desk. Sonia Brenner and Sandra Morgan have joined Sheryl White as visitor services assistants in the education department.

Sonia earned her bachelor of arts degree in comparative literature from Oberlin College in May 2000. She spent her junior year at the Paris Center for Critical Studies and the University of Paris. Sonia has taught at a nature center in West Virginia, served



as an art museum docent in Ohio, and most recently served as media liaison for a Washington, DC, mural project.

Sandra earned her bachelor of science degree in education from California University of Pennsylvania. She taught in the Pittsburgh public school system and at the Children's Place in Boston, where she served as lead teacher. Sandra recently started an enter-

prise that provides consulting services related to education for families and childcare centers. She



also writes haiku poetry, and her first book of poems will be published (on her own handmade paper) in November.

Sheryl has increased her hours at the front desk to four days a week. She earned her BFA and a teaching certificate from the University of Michigan College of



Architecture and Design. She has worked as a freelance graphic designer and illustrator, taught gardening basics at the Brookline Adult Education Center, and designed gardens. Sheryl exhibits her paintings at a number of venues in our region; through January 4 her work can be seen in a group show hosted by the Massachusetts Department of Environmental Protection in Boston.



Phil and Elaine Beals

Planning for the Future of the Arnold Arboretum

"I have had a life-long interest in gardening, horticulture, and farming, so the Arboretum has been a natural draw for me and I would just like to see it continue to succeed. I truly admire the Arboretum's mission of combined research, teaching, and public education. The Arboretum is a heartfelt place. It's just a joy to visit and I encourage its preservation. To support this wonderful institution, I have made a planned gift through Harvard and I hope others will do the same."

Philip C. Beals SB'42

To learn more about how you can support the Arboretum and also receive an annual income and tax benefits, please contact:

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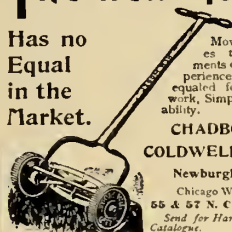
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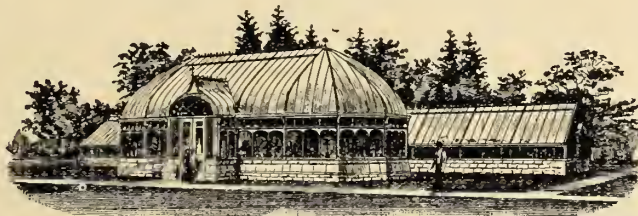
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arnoldia

GARDEN AND FOREST (1888-1897): PART TWO

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Covers: Advertisements chosen from issues of *Garden and Forest*.

Inside front cover: A drawing of a California cottage covered by a twelve-year-old Noisette rose, published in *Garden and Forest* (1891) as an example of "the possibilities of horticulture in that favored region."

Inside back cover: M. Landers' drawing of an olive tree in the Garden of Gethsemane, known as "The Tree of Agony" and popularly believed to exceed 2,000 years of age. *Garden and Forest* (1888) characterized it as "a venerable and characteristic specimen of a tree which has few rivals in its usefulness to the human race, while individually it is one of the best known and most interesting trees in the world."

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Garden and Forest's Journey to Cyberspace

LeeEllen Friedland

In March 1888, the first issue of a new periodical, *Garden and Forest: A Journal of Horticulture, Landscape Art, and Forestry*, was received by the Library of Congress for copyright deposit. Every week thereafter, until the journal ceased publication in December 1897, subsequent issues of *Garden and Forest* were added to the Library's collection.

Since the time of its original publication, *Garden and Forest* has provided readers at the Library of Congress—and other libraries—a distinctive and invaluable resource. Its pages contain a vast array of materials, from articles on entomology and pomology to advice on ornamental plant gardening to position statements on forest conservation policy to summaries of retail flower market prices. Every issue is generously illustrated with detailed line drawings, photographs, and landscape plans. The advertisements on the front and back cover leaves of each issue serve as a guide to commercial products and services of the time, including flower pots, seeds and bulbs, tools, glass for greenhouses and graperies, horticultural architects, nurseries, and gardeners. There are also advertisements for periodicals on agriculture and literature, and even a Pocket Kodak camera appropriate for amateur photographers who might wish to capture "snow-scapes" of "leafless trees and ice-bound streams."

How did *Garden and Forest* journey from the shelves of the Library of Congress, where it rested safely for a century, to cyberspace, where, in December 1999, it became the first complete serial publication digitized by the Library and released on the Internet? Three intertwining paths formed this journey and represented a confluence of issues—

digital technology, historical content value, and preservation needs—central to the Library's mission.

The Library of Congress began to explore the use of digital technology to create reproductions of historical collection materials in 1990. The goal of the early pilot program, called "American Memory," was to "get the champagne out of the bottle" in order to share the Library's treasures with broader audiences.¹ Most of the collection materials chosen to be digitized were nominated by Library curators, but some project ideas arose through other channels. One such instance was in response to a generous gift from Laurance S. and Mary French Rockefeller to fund digital collections about subjects of longstanding interest to them: President Calvin



Entrance to the Arnold Arboretum

Coolidge and his times and the history of the conservation movement in the United States.²

As work got underway on the digital collection to be called "The Evolution of the Conservation Movement, 1850–1920," Library staff were confronted with an embarrassment of riches. The Library of Congress has outstanding collections in the history of science, especially covering eighteenth- and nineteenth-century

America, and in the areas of gardening, horticulture, forestry, and landscape art. Among these riches, *Garden and Forest* stood out in several ways. In addition to primary information

on scientific topics, it provided a wonderful snapshot of the cultural history of the early conservation movement in the United States. A striking number of important individuals active in the burgeoning conservation movement published in *Garden and Forest*, and their writing spanned the broad range of interests that impelled them, including landscape design and preservation, national and urban park development, scientific forestry, forest conservation, horticulture, and botany. *Garden and Forest* also published the work of a significant number of woman authors, an unusual occurrence in publications of the time.

Although interest in *Garden and Forest* was high, technical impediments initially prohibited its inclusion in the American Memory digital collection. Over the next several years, some of those impediments lessened, but the journal's overall size—almost 9,000 pages—and the relative expense to digitize it in its entirety remained concerns. The frequent requests for *Garden and Forest* by researchers coming to the Library of Congress throughout this period, however, reinforced its importance as a resource.

During the time *Garden and Forest* was being considered for digitizing, Library staff noticed that its paper showed signs of deterioration, including embrittlement. At that time, the Library's Preservation Directorate began to develop its digital reformatting program to

provide another option for creating surrogates of original materials that might be damaged if used by readers. *Garden and Forest* was chosen as the first project for this new approach, and since standard procedure in preservation reformatting—with older technologies such as microfilm as well as new digital technologies—is to capture the complete work, there was no question that every volume of the serial would be digitized in its entirety.³ The Preservation digitizing approach also led to two fruitful collaborations for the Library: one with the University of Michigan, to deliver *Garden and Forest* on the Internet through a collaborative gateway that provides access to many nineteenth-century periodicals;⁴ and one with the Arnold Arboretum of Harvard University, to develop specialized access aids to the content, including background essays and a detailed subject index.

Since *Garden and Forest* was released online in December 1999, it has had a new and greatly expanded life among millions of pages of other electronic journals that provide full text access over the Internet.⁵ This has enabled tens of thousands of new researchers throughout the world, who might never have discovered *Garden and Forest* on a library shelf, to have a first-hand glimpse of a critical period in the history of the conservation movement in the United States and the development of related scientific fields.

Endnotes

- ¹ The American Memory digital collections can be viewed at the Library of Congress web site: <http://memory.loc.gov/>
- ² See: <http://memory.loc.gov/ammem/coolhtml/coolhome.html> and <http://memory.loc.gov/ammem/amrvhtml/conshome.html>
- ³ See: <http://lcweb.loc.gov/preserv/prd/presdig/presintro.html>; <http://lcweb.loc.gov/preserv/prd/gardfor/digitizegf.html>; and <http://lcweb.loc.gov/preserv/prd/presdig/presphase.html>
- ⁴ See: <http://lcweb.loc.gov/preserv/prd/gardfor/digitizegf.html>
- ⁵ See: <http://lcweb.loc.gov/preserv/prd/gardfor/gfhome.html>

LeeEllen Friedland is a Senior Specialist with the National Digital Library Program at the Library of Congress.



Advertisement



The avenue of Cypress trees . . . forms the most conspicuous feature of the garden of the Villa Giusti, in the city of Verona. The villa itself, a Renaissance building, is not of great architectural importance, nor are the gardens very extensive, covering, perhaps, an acre and a half of ground. But they are beautifully laid out in the true Italian style, and there is nothing in all Italy finer in its way than this Cypress avenue. The trees are probably some four hundred years old, and most of them are in fine condition . . . [Garden and Forest 2 (1889): 458]

Garden and Forest and "Landscape Art"

Ethan Carr

Laura Wood Roper notes in her 1973 biography of Frederick Law Olmsted that the 1890s were years of "staggering reverses" for the profession of landscape architecture. Pioneers such as Frederick Law Olmsted and H. W. S. Cleveland retired from practice, while the untimely deaths of Henry S. Codman and Charles Eliot diminished the next generation.¹ But it was also during this period that a body of theory and technical expertise was developed and became the basis for training landscape architects. What had been a practice, in other words, matured into a profession. And much of this transition is documented in the pages of *Garden and Forest*.

Garden and Forest, published from 1888 through 1897, benefited from an extraordinary group of editors and contributors who saw it as their best forum for shaping the profession of landscape architecture. Correspondents included (besides Olmsted, Cleveland, Eliot, and Codman) Beatrix Jones (later Farrand), Samuel B. Parsons, Charles H. Lowrie, Frank A. Waugh, O. C. Simonds, Warren H. Manning, Harold A. Caparn, Wilhelm Miller, J. C. Olmsted—all leading practitioners of the day. Eliot and Codman described European landscapes seen during the travels that had been part of their apprenticeship. Others discussed specific aspects of technique and practice, for example, "The Treatment of Slopes and Banks" (J. C. Olmsted), "Park Construction" (Cleveland), and "The Garden in Relation to the House" (Farrand).² The editors Charles Sprague Sargent and William A. Stiles published descriptions of showcase projects including the Boston Metropolitan Parks, the World's Columbian Exposition in Chicago, and Biltmore, as well as plans of smaller but typical residences and gardens.³ In an era before a professional organization or academic instruction existed in the field of landscape architecture, *Garden and Forest* took on aspects of both.

The magazine did all this, of course, while also promoting scientific forestry, botany, horticulture, city planning, and scenic preservation;

indeed, numerous professions trace their early development in part to the influence of *Garden and Forest*. But landscape architecture, which aspired to combine planning and design on many scales, enjoyed a special status in the magazine and influenced its editorial structure. Landscape architecture was not limited to the "planting of flower-beds and of ornamental shrubs," the *Garden and Forest* editors asserted in 1897, but was a "broad and catholic art . . . as useful in the preservation of the Yosemite Valley or the scenery of Niagara as it is in planning a pastoral park or the grounds about a country house."⁴ Descriptions like these summarized not only the ambitions of landscape architects, but also the editorial goals of *Garden and Forest*. It was the emphasis on landscape architecture, Stiles felt, that distinguished *Garden and Forest* from "any other garden paper."⁵ Stiles and Sargent published articles on horticulture and "country place" design alongside calls for the "Preservation of Natural Scenery" from suburban Boston to the Sierra Nevada.⁶ In the editorial tradition of Loudon and Downing, readers were urged to expand the aesthetic sensibilities developed in their own gardens and to become advocates for better management of the larger landscape, especially of public parks and forests.

If the practice of landscape architecture offered conceptual unity to *Garden and Forest*, the magazine in turn helped define the emerging theory of the profession. This was largely due to the contributions of the art historian and critic Mariana Griswold (Mrs. Schuyler) Van Rensselaer, who contributed a total of almost 50 articles beginning with a seven-part series on "Landscape Gardening" in 1888. Already an established art critic, Van Rensselaer became intrigued with landscape architecture through her friendship with the elder Olmsted. In her *Garden and Forest* articles, she set out to define landscape architecture as "landscape art," which, after architecture, sculpture, and painting, constituted the "fourth art" of design.⁷ To Olmsted's great satisfaction, she helped establish the professional status of landscape archi-



A VIEW IN CENTRAL PARK.

THE view on this page is taken from a point in the Ramble in the Central Park of this city, looking southward, and including a portion of the Terrace. Of course, it is much more than a picture of the Terrace, but it clearly shows how much this bit of architecture adds to the composition. The distant horizon line of trees has an attractiveness of its own. Nearer by are the upper Terrace lines contrasting with the masses of foliage above them. Below these are the open arches with deeper shadows, then the lower lines of the Terrace, the lake shore and the passage of water separating more distinctly the extreme distance from the middle distance. All these, with the lines of the shrubbery about the little lawn, mark the successive planes of the composition and help to bring out the gradations of light and shadow. In the Park the observer would enjoy in addition the ever varying tints of the sky which would also be reflected in the water, while he could look up to and into the leafy framework in the foreground forever without exhausting its interest. The illustration is a good example of what can be accomplished by framing in a distant object with foliage, so as to make a complete and consistent picture, and there is no reason why such planting as it shows should be confined to public parks. Many a lawn could be made the foreground of a picture quite as attractive, and it could be graded and planted so as to emphasize the interest and increase the pictorial effect of some important object, natural or artificial, and trees could be disposed about it so as to concentrate the attention which would otherwise be distracted by surrounding objects.

[*Garden and Forest* 1 (1888): 30]

fects by defining their practice as a fine art, unlike the craft or trade of gardening.⁸

Continuing this essentially Reptonian discourse, Van Rensselaer distinguished landscape art from the other fine arts by observing that it "uses the same materials as nature herself."⁹ The landscape gardener (her preferred term) "takes from nature not only his models but his materials and his methods." This "partnership with Nature" might seem to limit the artist's opportunity for self expression, a necessary quality of true art. But like the painter or the sculptor, the landscape gardener observes nature and "re-unites her scattered excellences" in artistic compositions that express the wholeness and unity that nature possesses but rarely reveals in a single place or view. Nature always provides "vitality, light, atmosphere," she concluded, and especially "what no other artist ever gets—perfection in details." But "composition . . . is the chief thing in art . . . and the landscape gardener's compositions are and must be his own."¹⁰

Van Rensselaer's contributions in *Garden and Forest* made her a foremost landscape theorist of her day, and her ideas would be taught to generations of American landscape architects.¹¹ If many of her discussions of nature and art would not seem out of place in the late eighteenth century, to a remarkable degree they also anticipated some of today's debates in the fields of landscape design and planning. Van Rensselaer deplored the naive tendency to assume that rural scenery was "natural," for example, when it was usually the (often unintended) product of generations of cultivation and management. Nature and art were rarely mutually exclusive in the landscape. Sargent and Stiles adopted this theme and criticized the excessive veneration of what was assumed to be natural or "wild" because it had led to the neglect of "that part of the landscape which is necessarily not wild—the landscape of our daily lives—the humanized scenery of the earth." In words that resonate today, they regretted the tendency of people to travel "in search of the picturesque while what might be the picturesqueness of their own neighborhood is unperceived or destroyed."¹²

Throughout the pages of *Garden and Forest*, simplistic distinctions between what is "nature" and what is "art" were condemned, as were dogmatic preferences for either the "natu-

ral" or the "formal" styles in garden design.¹³ "Landscape art" encompassed both spheres, which is why it offered a unique means for improving a broad range of public and private environments, from vacation villas to city plans and from municipal parks to national reservations. Landscape art was necessary in all these designs because without it they could never achieve the unity inherent in great artistic compositions. The "true artist" planned landscapes—from gardens to entire cities—by first analyzing and recognizing the "characteristic and salient aspects of the place," in order to "work in harmony with them instead of coming into conflict with nature."¹⁴

Garden and Forest was dedicated to advancing landscape design as a compositional "art," inspired by the greater composition and unity of "nature" and intended to integrate human society into the larger, natural environment. Landscape architecture was seen as the profession that would supply the necessary artists. But landscape art was not for art's sake alone. In an editorial reflecting the sentiments of the elder Olmsted (as was often the case), Sargent and Stiles state that "true art is not the servant of some temporary fashion, but something that is to endure, and must, therefore, have a permanent basis in the necessities and aspirations of human life."¹⁵

Among contemporary landscape projects, therefore, none received more attention in the pages of *Garden and Forest* than the Metropolitan Park Commission's system of suburban parks around Boston. Charles Eliot, who first proposed the system in an 1890 letter to *Garden and Forest*, was praised as an example of the "true artist" needed to successfully direct such a project.¹⁶ But the deaths of both Eliot and Stiles in 1897, followed soon by the demise of *Garden and Forest*, marked the end of one era and the beginning of another. Within three years, landscape architects had established their own professional organization, the American Society of Landscape Architects (1899), and instituted the first academic program in the field, at Harvard University (1900). The profession flourished, bolstered by a growing market for "country place" residential design. Whether *Garden and Forest's* ideals of "landscape art" survived as well in the new century, however, is an open question.

Endnotes

- ¹ Laura Wood Roper, *FLO: A Biography of Frederick Law Olmsted* (Baltimore: Johns Hopkins University Press, 1973), 475.
- ² *Garden and Forest* [hereafter, *G&F*] 1 (1888): 267, 326–327; 3 (1890): 129; 4 (1891): 184; 10 (1897): 132.
- ³ *G&F* 1 (1888): 508; 6 (1893): 361–362; 8 (1895): 481–482.
- ⁴ *G&F* 10 (1897): 192.
- ⁵ Quoted in Roper, *FLO*, 404.
- ⁶ See *G&F* 2 (1889): 133; 3 (1890): 257; 7 (1894): 1; 10 (1897): 222.
- ⁷ The articles, as well as at least one *G&F* editorial written by Van Rensselaer [6 (1893): 119–120], became the basis for her book, *Art Out-of-Doors: Hints on Good Taste in Gardening* (New York: Charles Scribner's Sons, 1893). In 1889, Van Rensselaer began a series of *G&F* articles on garden history.
- ⁸ *G&F* 1 (1888): 2.
- ⁹ The late 18th-century British landscape gardener Humphry Repton (who coined the term “landscape gardener”) was a figure of considerable interest to American landscape architects in the 1880s. When J. C. Olmsted, Eliot, and others began to meet as an informal professional society at that time, they named their group the “Repton Club.” Norman T. Newton, *Design on the Land: The Development of Landscape Architecture* (Cambridge: Harvard University Press, 1971), 386. Also see Humphry Repton, *The Art of Landscape Gardening*, ed. John Nolen (Boston: Houghton Mifflin Company, 1907).
- ¹⁰ *G&F* 1 (1888): 2, 14–15, 27, 38.
- ¹¹ *Art Out-of-Doors* was republished in 1925, and many of Van Rensselaer's ideas were assimilated into Henry V. Hubbard and Theodora Kimball's standard textbook, *An Introduction to the Study of Landscape Design* (1917; rev. ed., New York: The Macmillan Company, 1929).
- ¹² *G&F* 6 (1893): 531.
- ¹³ See *G&F* 1 (1888): 51–52, 481; 7 (1894): 261–262, 341–342; 10 (1897): 191–192.
- ¹⁴ *G&F* 6 (1893): 531.
- ¹⁵ *G&F* 9 (1896): 171; see Roper, *FLO*, 435.
- ¹⁶ See *G&F* 3 (1890): 85–86; 3 (1890): 109, 117–118; 7 (1893): 191.

Ethan Carr is a landscape architect with the National Park Service and the author of *Wilderness by Design* (University of Nebraska Press), which received the American Society of Landscape Architects' honor award in 1998.

THE FIELD OF LANDSCAPE-ART.

WE are constantly asked whether the profession of landscape-gardening offers a promising field for young men who are looking for some calling in life which will be useful and remunerative. We have always felt obliged to reply that there is comparatively small demand for the counsel of landscape-gardeners in this country . . . The prevalent idea is that his work is chiefly ornamental and that his province is to do about the same thing for the surroundings of a house that the decorative artist does for its interior when he selects the furniture, rugs and hangings and decided upon color-schemes and the like. That is, after an architect has built a house, it is considered proper to call in a landscape-gardener to plant some ornamental trees and shrubs about it and lay out paths and flower-beds in order to beautify the grounds. . . . In fact, the beauty of the scene, which includes both the house and the grounds, should grow up from the general design and framework of the house and grounds as a place where all the varied necessities of the family in the way of health and happiness and home life are the first things considered. . . .

All this means that a landscape-gardener ought to be much more than a mere decorative planter. The successful designing of public parks or of private grounds for daily occupation means first of all the study of human wants—the necessities of men and women and children of various circumstances and conditions. A good artist must be primarily a man of sound judgment and he should have a cultivated mind, wide sympathies and catholic tastes. Reading and travel and scholarship can do for the designer in landscape all that they can accomplish for the architect. A man may be able to mass a shrubbery effectively or arrange a border of herbaceous plants with skill and yet not have a particle of that profounder art which was seen in the grouping of the great buildings at the Columbian Exposition, and the planning of that Court of Honor which was the crowning artistic success of Mr. Olmsted's life. This view of the case contemplates an ideal that is rarely attained, and it is because the work of real artists in this line is rarely seen and still more rarely appreciated that the very existence of such an art is practically ignored or denied. . . .

[Editorial. *Garden and Forest* 10 (1897): 161]

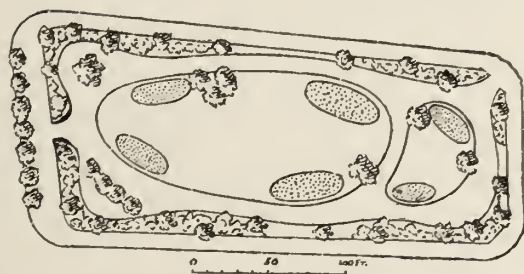
THE SQUARES OF PARIS.

ONE of the best features of the park system of Paris is the number of small squares scattered about in the different quarters of the city. The parks themselves, especially the larger ones, are at such great distances from the crowded centres of population, that the working classes, except on Sundays and holidays, seldom have a chance to visit them, so that these squares admirably serve the purpose of keeping the children out of the streets, and of allowing the poorer people, in the few hours of leisure they have during the week, to get a breath of fresh air and a glimpse of green.

A stranger, on first entering one of them, marvels as he sees how neatly they are kept while so thickly crowded with visitors, reading, working or playing. In plan they are usually quite simple, as the accompanying diagram will show. A

broad gravel walk, ten or twelve feet wide, following near but separated from the boundary by occasional shrubbery plantations, encloses a quiet piece of lawn sufficiently open to get a glimpse through to the opposite end, but planted on the sides with trees, shrubs and foliage plants.

There are few attempts at fancy garden-
ing, but much care has been taken to select hardy shrubs and plants with the view of



Plan of a Paris Square.

avoiding bare and empty beds during the winter. The condition of the turf is everywhere excellent, for water is freely used, and suitable small playgrounds are provided for the children, which serve the purpose of keeping them off the grass. These playgrounds, which are an admirable feature, are generally formed by simply widening the walks in the corners and planting enough trees there to afford ample shade. There are always one or two flower beds, which are kept bright and attractive during the spring and summer by a constant succession of showy flowering and foliage plants. Permanent seats are provided, but not in sufficient numbers to accommodate every one, but for a very small sum a chair for the whole morning or afternoon can be hired and you can move it about at will.

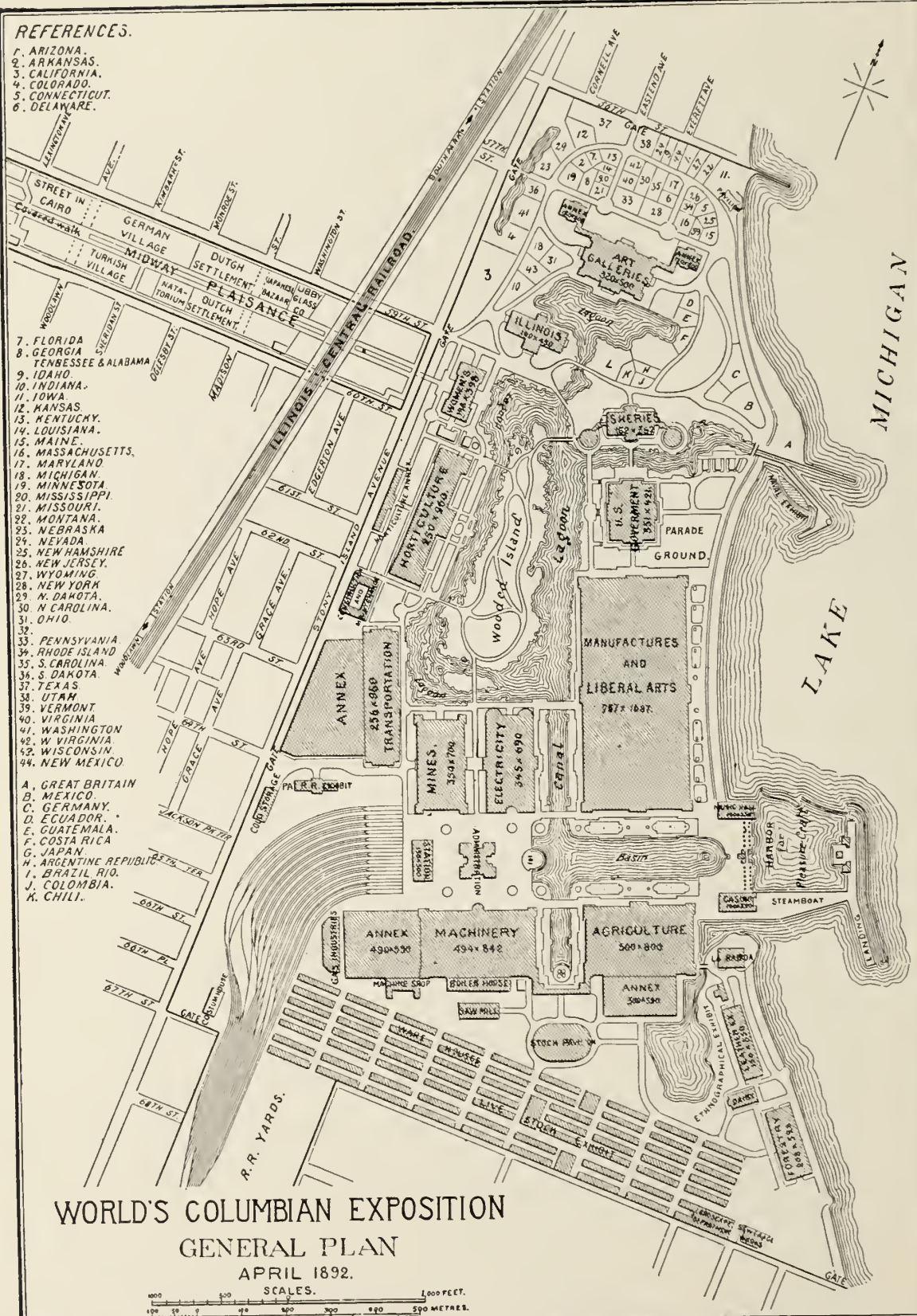
The only serious fault in all these squares is the stiff and formal appearance of the shrubberies. Almost without exception these plantations are in the form of regular figures—circles, ovals or ellipses—and they are always planted on slight mounds. These two facts detract very much from any effect of naturalness, and it seems a great pity that, when it is so easy to give a varying outline to the groups, it has not been done. It would also be an improvement to plant the borders of these beds with plants or shrubs of low, half trailing habit, and thus, in a measure, hide the sharp, stiff outline between the turf and the dug ground of the bed . . . in Paris there are no less than seventy breathing places, not counting the boulevards and other tree-planted streets. They are usually most attractive spots and teach a lesson which might very well be copied in many of the crowded cities of our country.

REFERENCES.

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- G. JAPAN
- H. ARGENTINE REPUBLIC.
- I. BRAZIL R/O.
- J. COLOMBIA.
- K. CHILI.



Plan of the Columbian Exposition in Chicago, April 1892, by F. L. Olmsted & Co.

THE PLAN OF THE COLUMBIAN FAIR GROUNDS.

MORE than twenty years ago a design was prepared by Messrs. Olmsted, Vaux & Co. for laying out three tracts of land which were known together as South Park, Chicago. One of these tracts is now Jackson Park, the site of the Columbian Exposition. Among the striking features of this plot of land, as pointed out in the report accompanying the plan alluded to, was its long frontage on the lake, which, in the opinion of the designers, added an element of such grandeur and sublimity that it compensated for the absence of picturesque elevations of surface, while at the same time it provided means of transportation by water from the city, whose business centre was some seven miles away . . . Visitors who come by rail would pass through the arches of this stately structure [the Administration Building, the loftiest and most strictly monumental building on the grounds] into the quadrangle, where their first impressions of the Exhibition will be received. A glance at the map will explain to some extent this arrangement and the magnitude of the scale upon which the whole idea is worked out will be understood when it is remembered that the basin contains nearly nine acres of water.

This plan of ushering visitors into the grounds through a porch of such dignity and into a court surrounded by architectural splendors, instead of letting them in through some side-entrance, so to speak, seems to us one of the finest inspirations of the design. No group of buildings approaching these in magnitude or of equal ambition in design, and related to each other so intimately, has ever been constructed in the entire history of architecture, and while the designers of the separate buildings have been allowed certain liberties as to details of expression they have worked together in perfect sympathy to secure a single consistent and harmonious effect . . .

[Editorial. *Garden and Forest* 5(1892): 289]

In the throng who witnessed on Monday the Columbian Exposition few probably realized that the harmony of the scene and the perfection and convenience of the whole scheme of arrangement were due to the genius of one man, Frederick Law Olmsted. Many others have brought to this great enterprise their gifts of labor, devotion, artistic training and the enthusiasm born of a great opportunity, but the spark of genius which has produced a single and consistent work of art, changing the sandy and uninviting waste of Jackson Park into a marvel of stately beauty, sprung from his brain. Of this the world may still be ignorant, but his associates realize and proclaim it; and the architects, sculptors and painters who have been inspired to their sincerest efforts feel that their work serves a nobler purpose, because the labor of each contributed to the harmonious development and expression of his comprehensive idea . . .

The foremost artist which the New World has yet produced, Mr. Olmsted, has been singularly fortunate in impressing himself during his own life upon his time and people, and in living to see with his own eyes the development and perfection of his greatest conceptions. The memory of his name and personality may be dimmed in the passage of years, for it is the fate of architects to be lost in their work, but millions of people now unborn will find rest and refreshment in the contemplation of smiling landscapes which he has made, and will enjoy the shade of trees which he has planted. No American has been more useful in his time or has made a more valuable and lasting contribution to civilization in this country.

[Editorial. *Garden and Forest* 6 (1893): 192]

THE GARDENS AT MONTE CARLO.

MANY are the sins that have been committed in the laying out and building of American towns, but the greatest of all, perhaps, has been the neglect or defacement of their water-fronts. Whether the adjacent water is ocean or great river, lake or little stream, we seldom see its shores turned to the best advantage, and often they present a more deplorable aspect than any other part of the town. In New York tumbledown, malodorous, muddy wharfs, flanked by streets which are frequently pools of water, line a shore that ought to be encircled by well-built, well-kept piers, and even the precious little expanse of Battery Park is daily threatened with curtailment; in Boston the back yards of Beacon Street houses lie along the wide estuary where a stately, tree-bordered esplanade should



The Gardens at Monte Carlo.

have stretched, and the river or brook which intersects a country town is most often edged by rickety sheds or fringed with ragged weeds, and is spanned by bridges as perishable as they are ugly. Of late years public attention has, indeed, been directed to the subject of water-fronts, and much has been done to secure them, in the outskirts of great cities, against the disfigurement that has overtaken them in portions already built. The parks at Chicago have been laid out with a wise sense of the value of the lake-frontage. Boston has claimed for similar purposes certain stretches of the Back Bay Shore, and New York has constructed Riverside Drive and bought the water-front near Pelham. But there is need that more should be done in this direction and that we should learn from older countries the art of beautifying the water-fronts we are beginning at least to reserve. All foreign countries are full of examples of this art, whether it has been employed merely to dignify reaches of shore that must be put to commercial use or to create ornamental promenades and gardens. The quays at Antwerp

are as good in their more prosaic way as the Thames Embankment in London. The Elbe at Dresden is not defaced by the structures that line its banks, though they are not all terraced promenades, but include steamboat-landings, private grounds, hotels and restaurants. At Rouen the chief hotels look out on a river crowded with shipping, yet look on a scene devoid of squalor or architectural meanness. At Lyons the great stream rushes between close-pressed ranks of tall buildings, yet a fine drive runs by it in many places, and everywhere the shore is agreeable to look upon. At Prague there is a truly magnificent series of wide esplanades upon which some of the finest buildings in the city have been placed, and a succession of bridges where the newest wrought-iron span does not seem out of artistic keeping with the famous great stone bridge which, until some of its arches were swept away last summer, had stood intact since medieval times. And so one might pass from land to land and town to town, only to find that everywhere the water-front is valued and everywhere is intelligently treated, with parks or avenues if possible, and if not, at least with respectable buildings and cleanly shores.

The picture we give [above] shows a peculiarly charming treatment of a water-front. As possessing the only public gaming-house still open in Europe, Monaco would in any case attract a multitude of visitors. But its development would never have been so great, and it would never have drawn thousands of tourists who do not come for the sake of gaming, had its situation not been so marvelously beautiful. The town itself, and the promontory of Monte Carlo where the Casino stands, overlook from their rocky heights the vast blue expanse of the Mediterranean, and the gift of nature has been sedulously enhanced by the intelligence of man. The drives along the cliff-edge are admirably planned, and, like the Casino gardens, show what may be achieved when architecture and horticulture are combined by an artistic hand. Monsieur Edouard André, the famous French landscape-gardener, never did a better piece of work than here, and the effect of his planting has been increased by the skill of gardeners who have caused Palms and other exotic plants to grow with extraordinary luxuriance. The treatment is somewhat formal, as befits the neighborhood of stately buildings and the presence of perpetual crowds of visitors. But there is no monotonous regularity in the arrangement either of the terraces and balustrades or of the sub-tropical plants which give such a singular charm to the spot in the eyes of travelers fresh from the wintry north. We can imagine what such a shore would be were this an American watering-place. It would doubtless not be given up to utter neglect and dishevelment, but a wooden paling would probably replace the marble balustrade, board walks the gravel slopes and marble steps, badly chosen trees in inharmonious variety the orderly avenue, and a stretch of *Coleus*-beds the beautifully grouped shrubbery. Of course, the exact treatment appropriate at Monaco would not be appropriate in a northern American watering-place; but something of the same orderliness, dignity and beauty ought to be secured far more often than it is. And while, in American country places, picturesqueness, rather than symmetrical stateliness, is usually appropriate, there are cases where it would be better to try for the more formal architectural charm which distinguishes the Casino gardens at Monte Carlo.

[*Garden and Forest* 4 (1891): 194]

THE NECESSITY OF PLANNING.

THE daily work of the architect and the landscape-architect is popularly supposed to consist in ornamenting lands and buildings so as to make them appear beautiful. Rooms may be inconveniently and awkwardly shaped, but they can be "beautified" by rich furniture and upholstery. Whole buildings may be irrationally planned, but they may still be made "artistic" by means of mouldings, carvings and mosaic. House and grounds and college grounds, private gardens and public parks may be senselessly, as well as ineffectively, arranged, but they may still be glorified by yellow and purple leafage. In short, "The world is still deceived with ornament."

On the other hand, although all seekers for the truth concerning beauty have discerned elements which defy analysis, such special students have nevertheless deduced from the visible and historical facts a whole series of fixed principles, which are quite as surely established as any of the other so-called laws of nature. Among these, perhaps, the most important is this, that "in all the arts which serve the use, convenience, or comfort of man, from gardening and building down to the designing of the humblest utensil which it is desired to make beautiful, utility and fitness for intended purpose must be first considered." It is to be remembered that this is not theory but law. As a matter of fact and experience satisfying beauty is not won unless the law of nature is obeyed.

That faithful and well-reasoned planning for the accomplishment of purpose is necessary to the success of the work of architects of buildings is now generally understood. "A plan" is a skillful combination of convenience with effectiveness of arrangement. "A design" is made up of plan, construction and outward appearance, and by no means consists of the latter only. Indeed, the external aspect of a structure depends directly on the mode of construction, the construction depends, in turn, on the plan, and the plan on the purpose in view; with the result that the whole appearance of the building inevitably and naturally expresses this purpose.

If it be true that expression, character, and even beauty are thus most surely won, in the case of buildings, by keeping decoration subsidiary and designing with purpose in view from the start, it is equally true of all the wide field of architecture, using the word in its broadest imaginable sense. "Architecture, a great subject, truly," says William Morris, "for it embraces the consideration of the whole of the external surroundings of the life of man; we cannot escape from it if we would, for it means the moulding and altering to human needs of the very face of the earth itself." A busy pasture or a smooth green field in forest-clad New England is as truly a product of human handiwork as a green meadow in treeless and dusty Utah, yet each is beautiful, and neither owes a particle of its beauty to decoration. The English deer-park, with its broad-spreading trees, or the churchyard, with its ancient stones and yews, the typical Yankee farm with its low buildings and great Elm, or the Live Oaks and quaint structures of the plantations of Louisiana, these and all similarly interesting landscapes are interesting, not because they have been decorated, but because they are strongly characterized and highly expressive. Their moving beauty is the natural product of straightforward work for the adaptation of land and landscape to human needs and uses.

Believing these things, it will be impossible for us, when a tract of land is newly dedicated to some special purpose, be it that of a suburban lot, a railroad-station yard, a new village, a country-seat or a public park, to stand by and see it thoughtlessly laid out and then, perhaps, turned over to the decorators. We shall insist on premeditation and careful fundamental planning, knowing that therein lies the best, if not the only, hope of happy results. Once possessed of faith in that law of nature in accordance with which beauty springs from fitness, we shall be ready to agree that, when purpose is served, formal gardens, rectilinear avenues and courts of honor are not only permitted, but commanded. On the other hand, we shall be equally strenuous in demanding studied planning and adaptation to environment and purpose in the laying out of whatever work may need to be done to make the wildest place of private or public resort accessible and enjoyable. Positive injury to the landscape of such places can be avoided only by painstaking, while the available resources of scenery can be economized only by careful devising. So with the whole range of problems which lie between these extremes. No work of man is ever successfully accomplished without taking thought beforehand; in other words, without planning.

And, strange as it may appear, opposition to such planning for effective results will not, in practice, be found to come from those who attempt decoration only because they know not how else to attain to the beautiful. Just as the literary class in China ruinously opposes change of any kind, so there is with us a comparatively small, but influential, body of refined persons, far too well educated to be "deceived by ornament," who most unfortunately, though unintentionally, assist in the triumphs of ugliness by blindly opposing all attempts to adapt land and landscape to changed or new requirements. Enjoying the pleasanter scenery of their surroundings as it exists—certain shady roads, or some lingering fields or farm-lands—these estimable people talk of "letting Nature alone" or "keeping Nature natural," as if such a thing were possible in a world which was made for man. No, the "moulding and altering" of the earth goes forward of necessity, and if those who ought to be leaders will not help to guide the world aright, the work will surely be done badly; as it is, in fact, done badly in the neighborhood of all our great towns. To refuse to exercise foresight and to adapt to purpose in due season, is simply to court disaster. Instead of hanging back, it ought to be the pride and pleasure of these very people to see to it that proper plans are seasonably laid for the widening of roads so that fine trees shall not be sacrificed, to see to it that electric-car tracks shall be placed only in suitably selected and specially arranged streets, that public reservations of one type or another shall be provided in accordance with some consistent general scheme, and that such reservations shall be saved from both decorative and haphazard development by the early adoption of rational and comprehensive plans. There is needed a little less selfish contentment in the doomed landscape of the present, a sharper sense of responsibility to the future and a living faith in that law of God, in obedience to which everything which is well adapted to use and purpose is sure to be interesting and expressive, and if not beautiful, at least on the way to be.

Brookline, Mass.

Charles Eliot

[*Garden and Forest* 9 (1896): 342]

PROPOSED PLAN FOR MADISON SQUARE, NEW YORK CITY.

... SIXTY years ago few buildings, except rural ones, stood north of Union Square, and the area now called Madison Square was an open tract some ten acres in extent in the centre of which stood a House of Refuge for unruly boys—an altogether neglected and unsightly tract, of which the only useful feature was a little pond used for skating in the winter. When the House of Refuge burned in 1839, efforts were made to improve the place, but nothing substantial was accomplished until the mayoralty of James Harper, between the years 1844 and 1847. This was some ten years before Central Park was thought of, and although Downing had already done some of his best work, he had not yet laid out those urban squares in Washington which first showed American eyes what might be accomplished in this direction.

When studied on paper the plan of Madison Square shows the working of design, not of accident; yet its treatment is so petty and monotonous, so

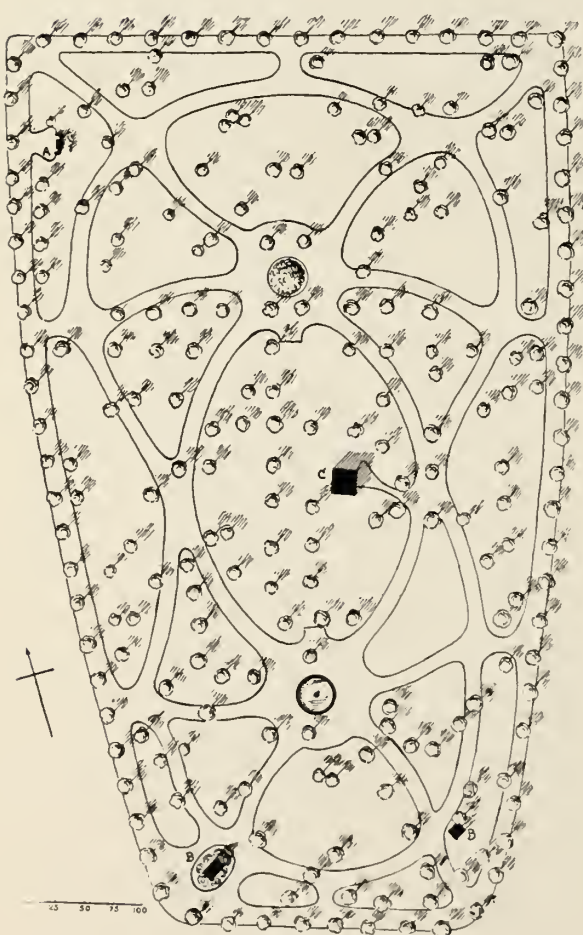


Fig. 18—Present Arrangement of Madison Square,
New York.

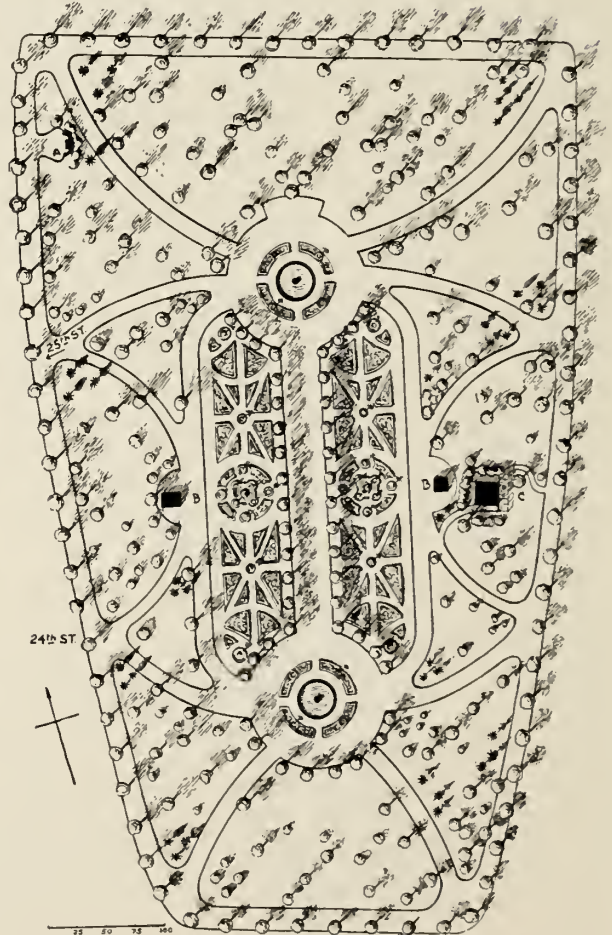


Fig. 19—Suggestion for the Improvement of Madison
Square, by E. Hamilton Bell and Daniel W. Langton.

wanting alike in broad unity, in effective variety and in conspicuous points of interest, that, we believe, few New Yorkers realize that it has any plan at all . . . The one virtue of the design is that those who wish to cross the park diagonally may do so with reasonable directness. And its chief defect is that its many minor paths cut up its lawns so pitilessly that the eye nowhere rests upon a quiet, reposeful stretch of green.

Truly naturalistic schemes of park design are, of course, more difficult to manage well on a small than on a large scale; and they are not as appropriate as others when the architectural surroundings of the pleasure-ground are of an obtrusively urban sort. Therefore, Messrs. Bell & Langton have sensibly conceived their rearrangement of Madison Square upon semi-formal lines. It may appear that in drawing their main paths anew they have made diagonal circulation less direct; but measurements show that, if anything, they have shortened the diagonal courses. By suppressing the minor paths they have won space for wide lawns. Yet the accommodation for strollers and for playing children, and for rows of seats as well, which is lost in this way, is more than made good by the broad mall which forms the central feature of their design, the two parallel paths which lie beyond its flanking flower-beds, and the large open circles which surround the basin that now exists, and the one which they indicate as balancing it toward the north . . .

[The plan] is published here less with the idea that Madison Square may actually be renovated according to its indications than in the belief that a comparison of it with the existing state of the Square will be instructive to those charged with the arrangement of new small parks in this and other cities . . . As a rule, a formal or semi-formal manner of treatment, resulting in a pleasure-ground which is properly to be called a large garden rather than a park, must be most appropriate for restricted areas in the heart of a great city. And Messrs. Bell & Langton show that such a manner of treatment need not exclude variety in design, abundance of shade, the reposeful effect of wide green lawns, or even such seemingly unstudied, yet artistic, arrangements of trees, shrubs and grass as may produce pleasingly naturalistic impressions and illusions.

New York City.

M. G. Van Rensselaer

[*Garden and Forest* 9 (1896): 143]

CORRESPONDENCE.

THE PLANS OF MADISON SQUARE.

To the Editor of GARDEN AND FOREST:

Sir,—All persons interested in park-making will certainly be grateful for the two plans of Madison Square in your last issue and the study of their comparative merits by Mrs. Van Rensselaer. Perhaps still further discussion may be helpful, and I therefore write to say that it is hardly correct to classify the old plan as belonging to the naturalistic class. I draw a heavy line (see fig. 22) to show how symmetrical it is except where it has been

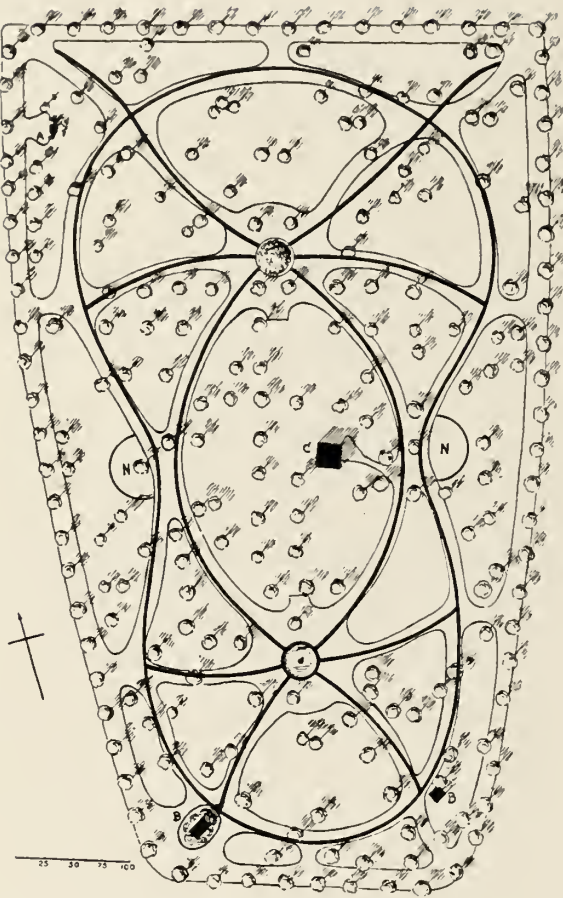


Fig. 22—Plan of Madison Square, New York.

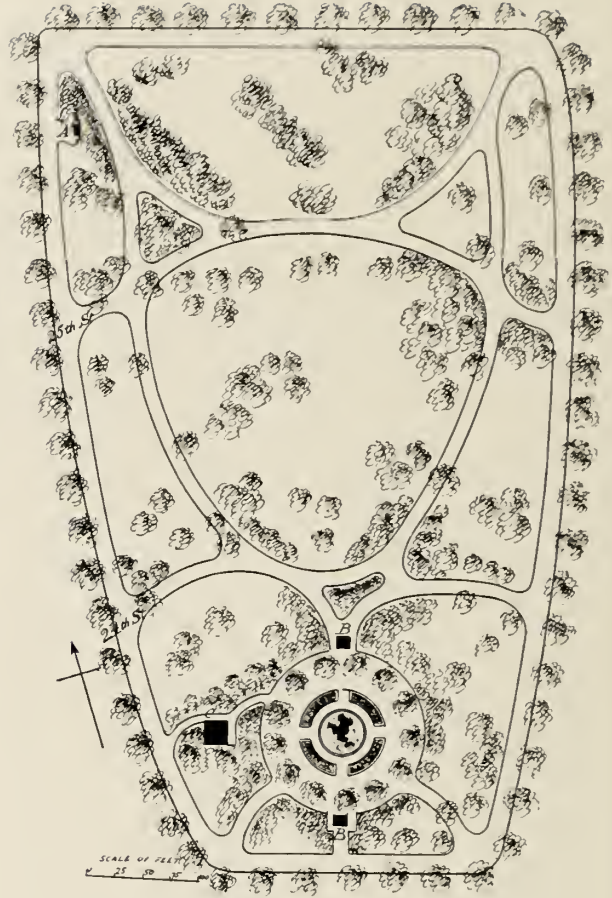


Fig. 29—Proposed Plan of Madison Square

distorted in two or three places. Curved lines are not necessarily natural. Of course, the building (C) ought to be less conspicuous than it is, and the revised plan corrects this. Plainly, too, the statues are introductions of a later date, and the original designer is not responsible for placing them where they are. They might be well removed to the points (NN). If this were done I do not discover any great superiority in the proposed plan over the old one. The area is so small that the insertion of a bit of rectangular treatment surrounded by a curvilinear treatment seems incongruous. Nor is it large enough for a "variety of design, abundance of shade, an effect of wide green lawns with seemingly unstudied, yet artistic, arrangement of trees, shrubs and grass, which produce pleasingly naturalistic impressions and illusions." An attempt to accomplish all this in so contracted a space must result in confusion. Let us have symmetry where this is needed, but curvilinear symmetry and rectangular symmetry ought not to be mixed up in so small a place . . . Altogether, if there could be some rearrangement in the planting to make the symmetry of the present plan more evident, it strikes me as better than the new ones . . . Messrs. Bell & Langton have been

hampered by their efforts to save standing trees, so that they were allowed very little freedom of treatment, and it is not fair to criticise their plan as an original work.

New York City.

S.A.

To the Editor of GARDEN AND FOREST:

Sir,—I observe that in both plans of Madison Square, published in your issue for April 8th, the paths which converge at the circles are very inaccurately centered—that is, the axes of the paths do not point to the centres of the circle, and if the designs were executed as shown on the map the result would be disastrous. This, however, may be simply carelessness on the part of the draughtsman. I should add that both plans ought to show great seating capacity. Seats ought to be recessed so that the feet of those using them will not be in the way of pedestrians, because the paths as wide as those in the plans give no more than the necessary walking space.

New York

L.G.S.

[*Garden and Forest* 9 (1896): 158–159]

MADISON SQUARE AGAIN

To the Editor of GARDEN AND FOREST:

Sir,—Your correspondent, S. A. . . . criticises the plan of Madison Square of Messrs. Bell & Langton because the centre of the park is formalized. I think the criticism just. He points out the symmetrical arrangement of paths as they exist, and says that the place is too small to contain formal as well as naturalistic effects. A seven-acre piece of ground is certainly too small for effects of wide green lawns if the centre is taken up with a rectilinear scheme covering more than an acre and a half. But seven acres are enough for naturalistic effects of respectable extent. Your correspondents (right, as I think) agree that formal features are desirable in a park of this kind. I do not believe, however, in the value of "symmetry" in lines of travel on a place of this size. This symmetry is not very obvious even on paper until emphasized by black lines, and it might be apparent to an observer hovering over it in a balloon. But how shall one who strolls into the square know that the path in which he walks is balanced by a similar on the other side? Artists in landscape too often forget that their paper plans are deceptive. Cannot effects of wide green lawns, abundance of shade and so forth be combined in seven acres with the popular formal effects? I think they can by relegating the formal design to a part of the ground where it will not interfere with the appearance of size. I enclose a design as a suggestion . . .

BB are the statues, C the kiosk, A the Farragut monument . . .

Pittsburg, PA.

H. A. Caparn

[*Garden and Forest* 9 (1896): 178]

HOUSE AT HONMOKU IN JAPAN.

THE photograph from which our illustration was drawn seemed to us of especial interest as displaying a Japanese solution of a problem very similar to that which often confronts a builder on the rocky shores of New England, especially north of Cape Cod, and on the borders of many of our inland lakes. This problem is to place a country-house on a rugged shore to the best advantage, while preserving, as far as possible, the natural character of the spot. It is only of very recent years that it has been so much as considered in this country. We have been much too anxious to imitate, under wholly different conditions, the country homes of Europe, and, in particular, of England. We have wanted to surround our houses with green lawns, well-kept flower-beds and trees symmetrical in shape and planted in accordance with the supposed laws of landscape gardening as practiced in countries all parts of which have long been subjected to cultivation. And we have too often tried to secure all this in actual defiance of natural conditions, and at the sacrifice of natural beauties which, to a really cultivated eye, would have seemed of priceless value. We have too often sacrificed the chance for a beautiful, wide outlook over the water by placing the house so far from the brink that lawns and drives could encircle it; have cut away the native growth of tree and shrubs—rough and straggling, perhaps, but picturesque and precious for that very reason—and replaced them by nursery specimens; have planted gardeners' flowers in the stead of nature's beautiful wild products, and in



the end, after a vast expenditure of time, pains and money, have succeeded in producing merely a bad imitation of an English villa, unattractive in itself, and utterly out of keeping with the landscape environing it.

Fortunately, tastes are changing, and one of the chief facts to be placed to the credit of the architectural profession in America to-day is the fact that it has developed a keen sense for the diverse natural beauties of our country, and an admirable power of adapting its constructions to the site and the surroundings at the moment in question. It is getting to be recognized as a binding aesthetic rule that a house shall conform itself to site and surroundings, and that these shall not be defaced to suit the character of a design abstractly evolved on paper, or tortured into the semblance of something which foreign hands had created under very different conditions. Many American homes exist, built within the last ten years, which are as worthy of praise from the point of view of appropriateness and picturesque charm as the Japanese house in our present picture . . . It will be noted that this house is placed quite at the edge of the cliff, so that the most extended possible view is obtained; that every tree which could be preserved in building it has been preserved; that the wild aspect of the spot has not been interfered with, and that the construction of man, alike in the house itself, and in the fences, steps and other surroundings, have been kept as simple and unobtrusive as possible. Picturesqueness is not the only quality to be prized, either in architectural or in gardening art, and it is a quality which, if forced into life where it does not naturally belong, is distressing to every cultivated eye. But when nature gives us picturesqueness in so clear and pronounced a form as here, the architect must accept her leading or ruin the effect both of her work and of his own. And spots quite as distinctively picturesque as this, and very similar in character, abound, as we have said, in many parts of our pine-grown, rocky coasts, and demand analogous architectural treatment. Naturally, to advise direct imitation of a Japanese house in America is no part of our desire, yet it may be said that the general architectural idea embodied in this house is far better fitted to adaptation in this country than most of those European models upon which we have so largely drawn in the past.

[*Garden and Forest* 1 (1888): 314–315, 319]

Each of us is constituted with a special idiosyncrasy related in some mysterious way to certain ideas of natural scenery, and when we find ourselves in a scene answering to our idiosyncrasy the mind feels itself at home there and rapidly attaches itself by affection. The influence of scenery upon happiness is far greater than is generally believed. There is a nostalgia which is not exactly a longing for one's birthplace, but a weary dissatisfaction with the nature that lies around us, and a hopeless desire for the nature that we were born to enjoy.

—*Philip Gilbert Hamerton.*

A sunset, a forest, a snow-storm, a certain river-view, are more to me than many friends, and do ordinarily divide my days with my books.

—*Emerson.*

FOREIGN PLANTS AND AMERICAN SCENERY.

IT is not easy to explain why certain plants look distinctly in place in certain situations and why other plants look as distinctly out of place in the same situations. This is a matter which nature perhaps has settled for us. It is certain at any rate that combinations of plants other than those which nature makes or adopts, inevitably possess inharmonious elements which no amount of familiarity can ever quite reconcile to the educated eye. Examples of what we wish to explain abound in all our public parks, and especially in Prospect Park in Brooklyn, where there is more of nature than in any other great park, and where along the borders of some of the natural woods and in connection with native shrubbery great masses of garden shrubs, *Diervillas*, *Philadelphus*, *Deutzias*, *Forsythias* and *Lilacs*, have been inserted. These are all beautiful plants. They never seem out of place in a garden; but the moment they are placed in contact with our wild plants growing naturally as they do, fortunately, in the Brooklyn park, they look not only out of place, but are a positive injury to the scene. It is not that their flowers are too showy or conspicuous for such positions. The flowers of some native shrubs like the *Elder*, the *Flowering Dogwood* and the *Viburnums*, are as showy as those of any garden shrub. The reason is rather that we have become accustomed to see certain plants adapted by nature to fill certain positions in combination with certain other plants in a given region; and that all attempts to force nature, so to speak, by bringing in alien elements from remote continents and climates, must inevitably produce inharmonious results. Landscape gardeners have rarely paid much attention to this subject, or sufficiently studied nature with reference to the harmonious combination of plants in the construction of scenery, and especially of scenery intended to produce upon the mind the idea of repose. Nature, nevertheless, is the great teacher to which the artist who would hope to imitate her, however crudely, must ever turn for instruction and for inspiration.

[Editorial. *Garden and Forest* 1 (1888): 266]

To the Editor of GARDEN AND FOREST:

SIR.—In GARDEN AND FOREST of August 1st, page 266, the law seems to me to have been laid down that the introduction of foreign plants in our scenery is destructive of landscape repose and harmony. No exception was suggested, and the word harmony was used, if I am not mistaken, as it commonly is in criticism of landscape painting, not of matters of scientific interest; not as if the question were one of what, in matters of literary criticism, is called "the unities."

That a fashion of planting far-fetched trees with little discrimination has led to deplorable results, no good observer can doubt. That these results are of such a character that we should, from horror of them, be led, as a rule, in our landscape planting, to taboo all trees coming from over sea, many of your readers will not, I am sure, be ready to admit, and if no one else has yet offered to say why, I will ask you to let me assume that duty.

Suppose anywhere in our Northern Atlantic States an abandoned clearing, such as in Virginia is called an "old-field;"—suppose it to be bordered by the aboriginal forest, with such brushwood as is natural to its glades and skirts straggling out upon the open;—suppose that mixing with this there is a more recent,

yet well advanced growth of trees and bushes sprung from seed, of which a part has drifted from the forest, a part from a neighboring abandoned homestead, while a part has been brought by birds from distant gardens, so that along with the natives, there is a remarkable variety of trees and bushes of foreign ancestry;—suppose a road through more open parts of the old-field, and that on this road a man is passing who, having lately come from New Zealand (or the moon), knows nothing of the vegetation of Europe, Asia or North America, yet has a good eye and susceptibility to the influences of scenery.

Now suppose, lastly, that this man is asked to point out, one after another, so that a list can be made, trees and bushes in an order that will represent the degree in which they appear to him to have an aspect of distinctiveness; No. 1 being that which stands out from among the others as the most of all incongruous, unblending, unassimilating, inharmonious and apparently exotic; No. 2 the next so, and so on.

The question, as we understand it, is essentially this: Would all of the trees and bushes that had come of a foreign ancestry be noted before any of the old native stock?

Some of them surely would stand high on the list, and some of much popularity, such as Horse Chestnut and Ginkgo and numerous sports of trees in themselves, at least, less objectionable on this score, as, for example, Weeping Beech and most of the more pronounced weepers; most of the Japanese Maples, also, and the dwarf, motley-hued and monstrous sorts of Conifers.

But, all? or, as a rule, with unimportant exceptions? So far from it, to our eyes, that we doubt whether, even of different species of the same genus, the visitor would not point out some of the native before some of the foreign—some of the American Magnolias, for example, before any of the Asiatic. We doubt if the European Red Bud, the Oriental Plane or the Chinese Wistaria (out of bloom) would be selected before their American cousins. It appears to us that *Rubus odoratus* would be noticed before *Rubus fruticosus*. Passing from the nearer relatives, it seems to us likely, also, that many of the European and Asiatic Maples, Elms, Ashes, Limes and Beeches would be named after such common American forest trees as the Catalpas, Sassafras, Liquidambar, Tulip, Tupelo and Honey Locust; that the American Chionanthus, Angelica, Cercis, Ptelia, Sumachs, Flowering Dogwood, Pipevine and Rhododendrons would be placed before some of the foreign Barberries, Privets, Spireas, Loniceras, Forsythias, Diervillas or even Lilacs. We doubt if the stranger, seeing some of these latter bushes forming groups spontaneously with the natives, would suspect them to be of foreign origin, or that they would appear to him any more strange and discordant notes in the landscape than such common and generally distributed natives as have been named. We doubt if Barberry, Privet, Sweetbriar and Cherokee Rose, which, in parts of our country, are among the commonest wild shrubs, or the Fall Dandelion, Buttercups, Mints, Hemp Nettle and a dozen others which, in parts, are among the commonest wild herbaceous plants, though it is believed all of foreign descent, would ever be thought, by such an observer, out of place in our scenery because of their disreputable and inharmonious influence. Two hundred years hence are not Japanese Honeysuckle, "Japanese Ivy" and "Japanese Box" (*Euonymus radicans*) likely to be equally bone of our bone in scenery? . . .

Again, may we not (as artists) think that there are places with us in which a landscape composition might be given a touch of grace, delicacy and fineness

by the blending into a body of low, native tree foliage that of the Tamarisk or the Oleaster, that would not be supplied in a given situation by any of our native trees?

Is there a plant that more provokes poetic sentiment than the Ivy? Is there any country in which Ivy grows with happier effect or more thriftily than it does in company with the native Madrona, Yew and Douglas Spruce on our north-west coast? Yet it must have been introduced there not long since from the opposite side of the world. Would not the man be a public benefactor who would bring us from anywhere an evergreen vine of at all corresponding influence in landscape that would equally adapt itself to the climatic conditions of our north-eastern coast? . . .

Before agreeing that no addition can be made to our native forest, except to its injury, we should consider that trees for landscape improvement are not solely those that please simply from their fitness to merely fall quietly into harmony with such as are already established. Trees would be of no less value to us that, being adapted to our climate, would supply elements of vivacity, emphasis, accent, to points of our scenery, such as we see happily produced by the Upright Cypress and the horizontally branching Stone Pine when growing out of Ilex groves on the Mediterranean. And this is a reminder that some scholar has said that we can form little idea of what the scenery of Italy was in the time of Virgil from what we see there now. This because so many trees and plants, which were then common, have since become rare, and because so many, then unknown, have since become common. Is there reason for believing that the primitive scenery of Italy was, on this account, more pleasing than the present?

The present large majority of foreign trees that have been introduced with us during the last fifty years, and which have promised well for a time, have been found unable to permanently endure the alternate extremes of our climate, but that there are many perfectly suited with it we have abundant evidence. Does the White Willow flourish better or grow older or larger in any of the meadows of its native land than in ours? . . . But on this point of the adaptability of many foreign trees to flourish in American climates, only think of Peaches, Pears and Apples.

Brookline, September, 1888

Frederick Law Olmsted

[Mr. Olmsted's letter should be read with the greatest care and attention. No man now living has created so much and such admirable landscape, and no man is better equipped to discuss all that relates to his art. The position which *GARDEN AND FOREST* has taken upon the question of composition in plantations made with the view of landscape effect is embraced in the following sentence, extracted from the article to which Mr. Olmsted refers: "It is certain, at any rate, that combinations of plants, other than those which nature makes or adapts, inevitably possess inharmonious elements which no amount of familiarity can ever quite reconcile to the educated eye." This sentence was written with special reference to the fact that in Prospect Park, in Brooklyn, various showy flowered garden-shrubs of foreign origin had been massed among native shrubs growing apparently spontaneously along the borders of a natural wood in the most sylvan part of the park. The effect which this combination produced appeared to us inharmonious, and therefore less pleasing than if the plantation had been confined to such shrubs as may be found growing naturally on Long

Island in similar situations. How far the idea of harmony in composition in landscape is dependent upon association it is hard to say. Mr. Olmsted acknowledges that trees like the Ginkgo, the Horse Chestnut and the Weeping Beech would look out of place in an American landscape—that is, trees which have no prototypes in our natural, native scenery. But would the inhabitant of New Zealand or of the moon, whom we suppose to be totally ignorant of the vegetation of the north temperate portions of the earth's surface, find anything to jar upon his feelings in seeing a Weeping Willow or a Ginkgo or a Horse Chestnut growing with and among Hickories, Tupelos or Sequoias, which may be taken as the three peculiarly North American trees? Probably he would find the combination an appropriate and pleasing one, and no feeling of inharmoniousness would ever cross his mind. Foreign trees with American prototypes, like the Beech, Linn[den], Red-Bud, Plane, from which they can hardly be distinguished except by a botanist, do not jar upon the sense of fitness when used in landscape planting here, because for all intents and purposes they are the same as our own species, except that, as a rule, they never grow here as vigorously; and, therefore, are less attractive objects. The European Oak, if it would grow here, might replace the American White Oak, which it closely resembles, anywhere, and this is true of almost every European tree which has an eastern American representative. We certainly did not intend to convey the idea that all American trees could be associated together harmoniously. One of the broad-leaved Magnolias of the southern Alleghany Mountains would appear as much out of place, from our point of view, in a northern landscape, as any tree from any foreign land could possibly do. This same Magnolia, however, amid the broad-leaved evergreens and luxuriant growth of the southern forests, seems to form an appropriate and necessary feature of the forest scenery. The fact that the Barberry in New England, the Cherokee Rose, the Pride of China tree, or the Ailanthus in the Southern States, when these plants are naturalized, and have been familiar objects for generations, do not look out of place in the landscape, confirms our idea that fitness comes not from similarity or dissimilarity of form or color or texture, but from mental association. When we have seen certain plants growing together often enough and long enough—that is, when they have been "adopted" by nature, to quote our own words—we become accustomed to the combination. It is only new and startling combinations which shock our mental susceptibilities. There is nothing more startling (and whatever is startling can form no part of a restful landscape) than to come upon an Apple-tree, as one may sometimes do in parts of New Jersey, growing in the midst of a thick Pine woods, and showing that the land had once been tilled. But if Apple-trees grew in our woods, and we had always seen them there, the combination would not seem an unnatural one.

The truth is that great masters of landscape construction can combine material drawn from many climates and many countries into one harmonious whole, but the masters of the art are not many, and the planter who is not sure of his genius can wisely follow nature in her teachings of harmony in composition. Had this reservation been made in the article referred to, our statement that "all attempts to force Nature, so to speak, by bringing in alien elements from remote continents and climates, must inevitably produce inharmonious results," would, perhaps, have been less open to criticism.—Ed.]

[*Garden and Forest* 1 (1888): 418–419]



WAYSIDE BEAUTY.

IN these days there is no lack of advice to plant trees by every roadside, and Village Improvement Societies are furnishing good examples of neatly kept highways. But many of our country roads are already bordered with trees and shrubs and climbing vines of Nature's own planting, and it is quite as important to preserve the wild beauty of this spontaneous growth as it is to provide for the more formal and stately rows of Elms and Maples which are planted on Arbor days. The illustration [above] gives a glimpse of a New England by-road which, fortunately, has escaped the axe and brush-hook of the enterprising path-master. Many officials in charge of our highways appreciate the value of trees when planted in straight rows and at equal distances, but a group of Cockspur Thorn, or Sassafras, or Black Haw, or a thicket of Sumach, or Hazel-nut, is too often looked upon as a disfigurement and a proof that the overseer is neglecting his duty to keep the roadside neat and clean. Miles on miles of wayside beauty are sacrificed every year to this mania for "trimming up," but the trees and shrubs spring up again to clothe the desert made by man. In smooth and level regions a strip of greensward bordering the wheel-way and running under the open fences into adjoining fields is always pleasing, and it cannot be too neatly kept. But in all hilly and stony regions east of the Alleghanies, no lovelier road-border can be conceived of than the native trees and shrubs which flourish where they are left to themselves . . .

[*Garden and Forest* 1 (1888): 42]

PARK-MAKING AS A NATIONAL ART.

THE *Atlantic Monthly* for January contains a noteworthy article under this title by Mrs. M. C. Robbins, who is well known to the readers of this journal. Her thesis is that the desire for the creation of beauty in America will find its fullest expression in the design and construction of public parks rather than in painting, sculpture or architecture. We have already done well in these latter fields, but our craving for liberty, and for enlarged and untrammelled utterance, can only be satisfied by bringing under control the mighty forces of nature and compelling them to develop and make manifest our artistic ideas . . . In our youthful exuberance we long for something that will appeal to all the people—something colossal and distinctly American—and this so-called Art of Public Improvement will find full scope in treating vast areas of mountain and cataract and forest in works of sufficient moment to need the support of sovereign states, or even of the Federal Government, and which need an army to protect them . . . Mrs. Robbins' conclusion is that "there is everything in the United States to nourish a great art—wealth, enthusiasm, generosity, a sense of boundless capacity, the verve and spring of youth and unlimited aspiration. In the Art of Public Improvement, the dreamer and the utilitarian can combine, the nation's beauty and the nation's wealth can in it be united, and our achievements may be such as to satisfy even American ambition" . . .

The rapidity with which the acquisition of park lands by cities has been going on will be understood when it is remembered that in 1869 there were only two well-advanced rural parks in the United States. Fifteen years later there were twenty, and now there is hardly a city of consequence in the country which has not made the beginning of a system of parks and parkways. It is true, as Mrs. Robbins says, that when the schemes now begun have been fully carried out we shall have public reservations reaching, in what is practically an unbroken series, from the eastern seaboard to the shores of California. "The idea of such a continuous reservation, a national parkway from the Atlantic to the Pacific, leading from one beautiful pleasure-ground to another, or passing through great tracts of woodland controlled by Government foresters, is not inconsistent with the genius of our country, which ever seeks a closer union between its parts; while the gradually enlarging park systems of our cities indicate the way it may be brought out in the linking together of suburb to suburb by great boulevards, which tend to bring civilization to distant homes by affording safe and easy communication between them" . . .

We no longer hear objections of this sort against park-building, but there is another danger that ought to be shunned. It is not enough to secure a certain number of acres where they can be had with least cost and trouble. In the first place, the land should be wisely selected and its boundaries intelligently determined. Design for its improvement must be made by competent artists and executed with skill. When completed, pleasure-grounds must be maintained with care, for, if left to uncontrolled nature and unpoliced, they may become repulsive desolations. To secure a good design we need a school of landscape art, for, although such a school will never create a great artist, it can teach him the history of what has been done, point out to him what tools he needs and how to use them, and show him how he can most directly reach his end . . .

NOTES.

Mayor Hart, of Boston, has written to city forester Doogue requesting him to make flower-beds on the Common and in the Public Garden which shall imitate in form and color the United States flag, the Massachusetts coat of arms, the seal of the City of Boston, and the badges of the Loyal Legion, the Woman's Relief Corps and the Sons of Veterans. And yet it has been asserted and believed that Boston is a city of culture and refinement. [3 (1890): 148]

Besides its great parks, London now has 198 open spaces of less than ten acres in extent, with an aggregate area of three hundred and fifty-four and a half acres. Most of these grounds have been secured for public use in comparatively recent time, and the *Gardeners' Chronicle* well says that any one who would have ventured to prophesy fifty years ago that there would have been now nearly two hundred such places for recreation and resort in the great city, would have been laughed at as a dreamer. [8 (1895): 10]

One of the most curious trees in Germany stands on the left bank of the River Oder, in Ratibor, Silesia. It is a Maple, at least one hundred years old, which has been twisted and cut into a sort of circular two-storied house. A flight of steps leads up to the first level, where the branches have been gradually woven together so that they make a firm leafy floor; above this is a second floor of smaller diameter, formed in the same way; and the ends of the branches have been woven into solid walls, and cut so that eight windows light each of the apartments. Below the first floor, at the level of the second, and at the top of the tree the boughs have been allowed to grow out naturally, while the intermediate walls and the edges of the window-like openings are kept closely clipped. [7 (1894): 270]

An English lady, Miss Wilkinson, has, in recent years, made herself widely known as a landscape-gardener, capable of undertaking public works and of carrying them to completion under her personal supervision, and Vauxhall Park, in London, opened to the public last year, is one of her latest works. Commenting upon these facts, and characterizing Vauxhall Park as "a remarkable work in every respect," the *Revue Horticole* recently said: "So we see that a woman has entered the professional camp, the camp of practicing artists, and has proved her right to a distinguished place in it by worthy results. It seems a curious sign of the times. Who knows whether the delicate gifts of woman may not introduce valuable innovations, unknown refinements, into our gardening conceptions?" [8 (1895): 100]

From the twenty-sixth annual report of the Park Commissioners of West Chicago, it seems that the parks in that city are suffering from the same abuses of which the Park Board of Buffalo complain. It is said that visitors make walks across the turf and mutilate the plants. There is no cure for such a state of things except a more elevated and refined public sentiment. A community which allows the beauty of its public grounds to be trampled out so far proves itself lacking in certain elements of civilization. The people who are helping to devastate the Chicago parks, the wealthy men in this city who have tried more than once to turn Central Park into a trotting-course, the wheelmen and horsemen who are endeavoring now to confiscate a part of the Buffalo park system for bicycle tracks and speedroads, all belong to the same class. They are not intentionally public enemies. The trouble is they are not yet completely civilized. [8 (1895): 120]

Mr. W. K. Dexter, of St. Louis, has offered to present 250 acres of land at Hiawatha Lake to the people of Hennepin County, Minnesota, as a public park. The donor's purpose is to have the tract preserved in its natural state, and he therefore makes it a condition of the gift that no landscape-artist shall be allowed to touch it. Mr. Dexter evidently entertains the mistaken belief that landscape-art and formal gardening are identical terms, or, at least, that landscape-gardening means primarily the destruction of natural beauty to make room for something that is artificial. Perhaps, too, he has not considered the fact that the highest beauty of this wild tract will never be discovered until some real artist studies out a practical scheme for making its key-points inviting and accessible, nor that its original charm will surely disappear as it becomes frequented unless provision is made for restoring what is worn away and maintaining and developing its essential elements, a work which also requires the highest artistic taste and training. When Mr. Dexter gives himself thoroughly to a study of the problems of design and maintenance, which must be solved if his praiseworthy and public-spirited purpose is to be carried out to the best advantage, he may still feel inclined to resent any suggestions from the class of landscape-gardeners whose loftiest aim is to arrange flower-beds and plant purple Barberries and golden Elders on suburban lawns, but he will welcome the advice of some true artist in landscape, who will be certain to have a broad appreciation of Nature and a respect for her simplest as well as her noblest manifestations. [8 (1895): 320]

The Influence of *Garden and Forest* on the Development of Horticulture

Mac Griswold

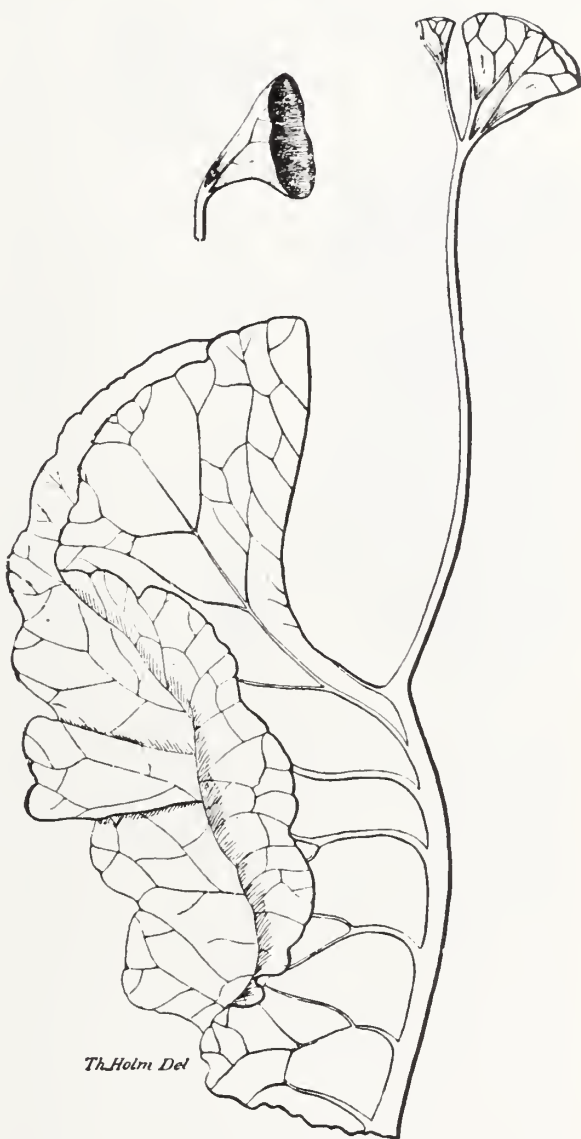
Garden and Forest: A Journal of Horticulture, Landscape Art, and Forestry, the brainchild of the Arnold Arboretum's first director, Charles Sprague Sargent, was published during a period (1888–1897) when the science of everything that grows—wild or cultivated—was still (barely) considered a single discipline. It's as if today's readers of, say, *Scientific American*, *Natural History*, *Martha Stewart Living*, and *The Nation* could scan the weekly issue of a single sixteen-page magazine and find detailed articles of specific interest to them.

It can't go without comment, however, that *Garden and Forest's* readers were assumed to have general interests that far outran any narrow bounds of the subjects listed in its title. In 1889 Harper & Brothers, the New York publishing house, ran advertisements in the magazine for William Dean Howell's latest novel, *April Hopes*; for a Miss Juliet Corson's work on how to feed a family on \$500 a year (subtitled *A Daily Reference Book for Young and Inexperienced Housewives*); and for a Civil War history written by an African-American who had served in the war, *A History of the Negro Troops in the War of the Rebellion, 1861–1865*, by G. W. Williams, LL.D.

Within this diverse setting *Garden and Forest* nonetheless published many editorials and articles that mark the beginnings of the specialized disciplines of horticulture, landscape architecture, botany, and forestry, with practitioners debating the directions their developing fields should follow. Horticulture,



Bruchus limbatus.



Malformed cabbage leaf.

then as now, seems to have been the most vaguely delineated of the four, though as landscape architecture and forestry, previously considered to be aspects of horticulture, evolved into separate professions, the practice of horticulture became more circumscribed as well as more professional.



Agaricus proceras, parasol fungus.

Before reading those debates therefore, it is wise to scan the pages of *Garden and Forest* for an idea of what was meant by "horticulture" in late nineteenth-century America. Today's general reader could assume that the term referred first and foremost to ornamental horticulture, as it does now. But in 1888 horticulture, which had piggybacked on agriculture since the days of colonial settlement, was still concerned with fruit and vegetable gardening to a very large extent. In 1888, the late Elisabeth Woodburn, an authority on horticultural literature, wrote an addendum to a new edition of U. P. Hedrick's *A History of Horticulture in the United States to 1860* (originally published in 1950). Tallying books published on various "horticultural" topics between 1861 and 1920, she arrived at the following ranking, from highest to lowest in number:

HORTICULTURAL EDUCATION.

IN a recent number of this journal it was held that the study of horticulture and agriculture in their scientific aspects has a distinct value as a factor in furnishing exercise for certain powers of the mind. Every one admits that the natural sciences should have a place in the curriculum of colleges and schools as elements of wholesome intellectual development . . . but the fact should be emphasized that the mental exercise and discipline furnished by horticultural education in its broad sense is equal, and perhaps superior, to that furnished by the study of any other science. No kind of mental application will be more effectual in forming habits of careful observation and comparison and in securing those orderly methods of thinking which are of the greatest use in the examination of many of the problems which confront us in our daily life.

In an article in a recent number of *Science* on Horticulture at Cornell, we are glad to see that this view is set forth with considerable fullness by Professor Bailey, who contends that horticulture as studied at that university is capable of adding much to the value of a course of liberal academic training. Professor Bailey illustrates the merits of horticulture as a science by showing some of its uses and applications in discussing the theory of evolution, which is perhaps now the most important conception with which the thinking world has to deal. In supporting the hypothesis of evolution, horticulture shows the development of life in actual operation. More than six thousand species of plants are cultivated, and most of these have been broken up into varied forms by the touch of man. Some species have produced thousands of distinct forms, and the methods of the production of many of them are on record. In place of arguments as to the probable influence of climate upon plants the horticulturist cites definite cases, so that there is no conjecture about the matter. Instead of speculating upon the transmission of acquired characters the horticulturist furnishes proofs of such transmission. Paleontology brings disjointed evidence in regard to the influence of selection and probable changes from environment, while the horticulturist brings examples before our eyes to prove that he can modify and mould vegetation at his will. The horticulturist creates new species and shows you numbers of cultivated plants of which no one knows the original form, because the ones with which we are acquainted are so unlike the type that the two can never be connected. This is only a single line of inquiry, and other illustrations quite as striking can be given to show that there is an abundant field for scientific research and profound thought in horticultural science as such . . .

[Editorial. *Garden and Forest* 9 (1896): 31]



A Double-flowered Cyclamen.

Garden and Forest covered all these categories, offering descriptions of new species and of gardens and giving cultural direction and design advice. It also published articles specifically for greenhouse propagators and growers; articles for professional florists included a weekly flower-market bulletin. All this played a part in shaping the development of modern horticulture.

Most effective in promoting horticulture as a professional discipline separate from botany



Proliferous flower of Cyclamen.

and landscape architecture, however, were some hard-hitting pieces that both criticized and set goals for horticultural training. For example, the publication in 1889 of an editorial on the negligible quality of American horticultural education in the same

fruits; vegetables; practical horticulture (propagation and cultivation); landscape and gardens (by which she meant design); and then flowers, flower gardening, and ornamental plants, which she ranked last.

issue as a description of the French national school of horticulture clearly illustrated the two sides of the debate on professional training, the big question that eternally enlivens any discussion of horticulture being: How much is science and how much is practice?

Such American schools of horticulture as now exist, the 1889 editorial proposed, "provide an excellent course of botanical study and offer instruction in some branches of practical horticulture. It will not, however, be maintained by the best friends of these schools, that a well equipped gardener was ever graduated

from any one of them." In other words, the real lack in American training was experience in actual gardening.

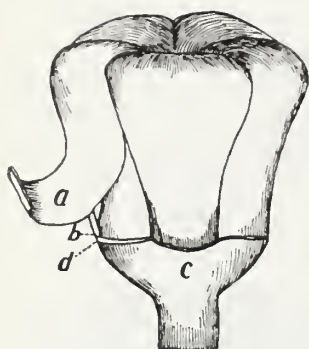
The schools' problem arose from "the want of appreciation of the requirement of a sound horticultural education on the part of their founders, and in part from the prevailing tendency of the American people to be satisfied with a hasty and insufficient training for any vocation in life." Until there is a market for skilled men that will cause wages to rise, the piece curtly concludes, "our Schools of Horticulture can wisely give up trying to teach young men who do not want to be taught, and devote their energies to those wider fields of usefulness which, fortunately, are open to them, and by experiments, and in many other ways, at least help to create the demand for skilled gardeners which they were founded to supply."¹

Garden and Forest's description of the three-year course at the National School of Horticulture at Versailles could be called its formula for an ideal horticultural education. This short piece is the work of Henry Sargent Codman, Charles Sprague Sargent's nephew and Frederick Law Olmsted's promising (and short-lived) young employee. At twenty-five he was studying in France with Edouard François André, the French landscape architect soon to be appointed head of the Versailles school. The essence of his piece is that of the editorial: American horticultural training needs more of the practical.²

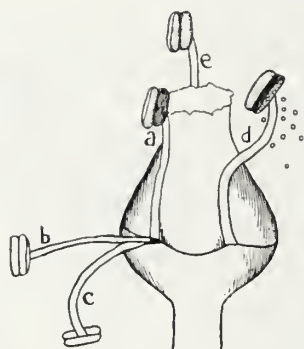
An 1899 editorial argued strongly for a hefty dose of science even in the most practical applications of horticulture. It cited a pronouncement, both snobbish and categorical, by the then director of the Royal Botanical Gardens at Kew that "Horticulture is essentially an empiri-



Poppies and their background.



The Opening bud of a
grape-flower.



Pistil and stamens of a
grape-flower.

cal art. Botanical science can afford little *a priori* information as to the cultural conditions which any plant will require or tolerate; these for the most part can only be found out by trial and experience."³ In other words, farmers and growers should not be taught science.

The editorial went on to offer a tentative but genuinely populist answer: "When it is stated that the gardener who has a genius for his work will 'naturally hit upon the right method' of cultivation, this means that the gardener has been doing just what the man of science would have done if he had been engaged in research in the same field. It seems to our people that a man who knows why he adopts a given method of cultivation is likely to be a more practical cultivator, less likely to fail in the essentials of the practice, than one who blindly follows the rule of thumb. Horticulture and agriculture, too, are no doubt largely empirical arts; but we sympathize in the belief that the addition of scientific knowledge will help to place them on a foundation more sure and productive than that of individual experience." In other words, farmers and growers should be actively involved in, and the beneficiaries of, scientific horticulture. *Garden and Forest's* balanced and democratic editorial stance may well be what, in the long run, did the most for the development of modern American horticulture.

The editors' stance was also well borne out in articles such as those by George Lincoln Goodale, the Fisher Professor of Natural History at Harvard. His long series on the principles of physiological botany helped to define the synergy between the scientist and the gardener as

integral to modern horticulture, without any hierarchical distinction.⁴ His mild-mannered prose is as easily understood by a lay audience as by a professional one and his science would have been as useful to a greenhouse propagator as to an interested fellow professor. That is to say, his experiments were exactly those that would "help to create the demand for skilled gardeners" deemed so necessary in the 1899 editorial cited above.

Goodale's thirteenth piece, "Some of the Conditions Which Favor Rapid Growth—Certain Physical Phenomena of Growth," includes a vivid little section on the remarkable strength of cellular growth in plants. His final sentence on the prodigious and often hidden power of root growth could stand as a metaphor for the manner in which all the articles and much of the debate published in *Garden and Forest* helped lift modern horticulture to new heights by addressing a small, intelligent, interested, and yet demographically broad audience over a single decade. "The force exerted in all these instances," Goodale writes, "has been exercised solely by the innumerable delicate, thin-walled cells, which increase in number and in size in the orderly manner we have attempted to describe."⁵

Endnotes

- ¹ "Schools of Horticulture," *Garden and Forest* (hereafter, *G&F*) 2 (1889): 25.
- ² H. S. Codman, "The National School of Horticulture at Versailles," *G&F* 2 (1889): 27.
- ³ "'A Gardeners' Problem,'" *G&F* 3 (1890): 149.
- ⁴ "Principles of Physiological Botany as Applied to Horticulture and Forestry," *G&F* 2 (1898): 8–9, 20–21, 32–33, 44–45, 56, 68–69, 80–81, 92, 104–105, 116–117, 128–129, 140–141, 153, 164–165, 177–178, 188, 201–202, 213–214, 225, 249–250.
- ⁵ *Ibid.*, 153.

Mac Griswold's most recent book is *Washington's Gardens at Mount Vernon: Landscape of the Inner Man* (1999). She is also the author of "A History of Gardening in the United States," in *The New Royal Horticultural Society Dictionary of Gardening* (1992), edited by Sir Aldous Huxley, and the co-author of *The Golden Age of American Gardens* (1991).

THE EFFECT OF GARDENING UPON THE MIND.

A taste for gardening is one of the elemental impulses of humanity. There are individuals without it, as there are people without sight or hearing or a sense of smell; but, on the whole, to dig comes naturally to man, and at some time or other in the course of his existence the desire to own a portion of the earth's surface is apt to seize upon him and demand satisfaction.

This impulse is of maturity rather than of youth, for gardening in its larger sense is a thoughtful pursuit, appealing to the broader qualities of the understanding. It is not merely the desire for healthful exercise which stirs a man, but also the wish to learn the secrets of our common mother, to force her hand, as it were, and compel her to reward his toil. The fable of the giant Antæus, who renewed his strength when he came in contact with the earth, has a subtle meaning, for it is by this contact that many weary souls have found rest and arisen refreshed . . .

[Editorial. *Garden and Forest* 4 (1891): 505]

VARIOUS MOTIVES FOR GARDENING.

WE have just received a letter from a valued correspondent in which he says that he cannot understand the insistence of GARDEN AND FOREST upon planning and planting for general effect. He delights in his garden, but his pleasure is not associated in any degree with the landscape as he understands it. He loves plants, he appreciates the beauty of flowers, he enjoys their companionship and he reads with interest everything that is said about new or old ones which any way broadens his knowledge of their habits and helps him to cultivate them more successfully. He finds abundant comfort in gardening of this kind, but he sees nothing to attract him in landscape-gardening. No doubt, this statement represents the innermost feeling of many people who take a genuine interest in horticulture, and it is often expressed to us in one way or another. With people of this taste and temperament the garden exists for its plants, and the plants are not grown for the sake of the garden. That is, a garden in this view is a place where a collection of plants is carefully attended and enjoyed for their individual beauty and other interesting qualities, and with no purpose of forming, in connection with the house, any picture which is to be studied and enjoyed as a whole. Perhaps the majority of all who are interested in gardens sympathize with the view of our correspondent, and they find a real pleasure, and pleasure of a most refining and refreshing kind, in their practice. It is our belief, however, that they might do all this, and at the same time gain a new and ever-growing satisfaction if they gave thought to the general modeling and arrangement of the whole scene as well as to its individual details.

[Editorial. *Garden and Forest* 9 (1896): 341]

One beautiful way in which flowers can be used, especially those distinguished for the brightness and clearness of their coloring or for their tall stalks, is to plant them in moss and among wild vegetation along the edge of a brook or some other piece of water. The reflections in the water and the play of their movements thus doubled clothes with a new charm this scene which is altogether natural.

—Hirschfeld's "*Theorie der Gartenkunst*," Leipzig, 1777.



A Japanese Flower Vender's Basket. There is no country in the world where flowers are so universally beloved as in Japan. They are inseparable from the life, art and literature of the people, and to deprive the Japanese of their flowers would be to take the sunshine out of their lives . . . Flowers are distributed among the people by means of perambulating flower-sellers, and by flower-fairs. The seller goes about the streets carrying two huge bamboo baskets swung from a pole across his shoulders. These baskets are divided into a number of different compartments, each containing a different variety of cut flowers or leaves. The carrier is sometimes almost hidden by the great mass of flowers and foliage he bears . . . *Theodore Wores*. New York. [1 (1888): 338-339]

DELIGHTS OF A ROUGH GARDEN.

IN offering suggestions on gardening to the enthusiastic beginner it is usual to lay down at the outset a few unmistakable rules for his prudent guidance: Undertake no more than you can care for with thoroughness. Neatness is the first essential. Be content with small beginnings, and so on indefinitely.

The pleasures of the opposite plan, the rich satisfaction of a big, rough garden, in which beginnings and complete successes are somewhat loosely connected, and yet where freedom and beauty do live together in harmony, these attractive possibilities seldom find an advocate. On the strength of an experiment now in its fourth year I beg leave to put in a plea for the garden in which neatness is not a first essential. It seems quite possible to make a kind of treaty with Nature, in which she consents to do for a rough, yet much-loved garden filled with all sorts of tentative beginnings of loveliness, that which she does with so much charm for any old abandoned garden left wholly to her possession. The lover of wild beauty, who loves tamed and cultured beauty also, may find an opportunity for gardening upon this scale on any little country place of a few acres . . .

One of the delights of a rough garden is its continual surprises. With the habit of tucking in seeds, cuttings, roots and bulbs, as occasion serves, planting and sowing without formality, there is something very delightful in the apparent spontaneity with which unlooked-for bloom and beauty often come to light. Broad mixed borders in which hardy plants are irregularly grouped (not without a constant study of the advantages of contrast and relief) make this the simplest matter possible. The Iris or the Lily bulb is buried, the seed is sown and the ground occupied staked to prevent accidents; suddenly, as it seems, a new shape of delicate beauty greets the eye. A big rough garden gives an encouraging opportunity to experiment . . . Not annuals and biennials merely, but shrubs and trees also increase and multiply with extraordinary ease in the rough garden, where the discipline is not too severe. Fruit and flower, shade and fragrance, homely use and stately adornment mingle happily here in the garden held in partnership with Nature . . .

Amherst, Mass.

D. H. R. Goodale

[*Garden and Forest* 9(1896): 303-304]

FARMING ON VACANT CITY LOTS.

DURING these times of agricultural depression the profits realized by farmers, even under the best conditions, are meagre enough, and, therefore, when Mayor Pingree, of Detroit, first conceived the idea of utilizing vacant city lots for the growing of potatoes by the unemployed of that city—that is, by men who were generally quite ignorant of the theory and practice of cultivating the soil—the experiment was looked upon as visionary, if not ridiculous. The result of the first year's cultivation, however, which enabled nearly one thousand families to support themselves through the winter by their crops alone, stimulated certain public-spirited citizens of New York to make a similar effort here, and the result is published in No. I of the periodical *Notes*, published by the New York Association for Improving the Condition of the Poor. Of course, the philanthropic aspect of this experiment is the one of prime importance. The result proves that

many persons who own vacant land would prefer to have it cultivated instead of lying idle and unproductive, and that a very limited area will suffice to raise enough vegetables to contribute largely to the support of a family through the winter. It proves, too, that very many of the destitute people in tenement-houses are willing to work and can be made to support themselves with a very little help advanced as a loan. Besides this, the project offers a natural plan for giving to the people who dwell in stifling tenement-houses opportunity to work for themselves in the open air and under healthful conditions. It gives mothers the advantage of taking their children out of the heated houses and giving them a taste of rural life. It enables the superannuated and partially crippled to support themselves. In addition to these advantages, the entire scheme has a substantial business basis, with none of the odious and depressing suggestions of a charity.

Naturally, however, the educational side of this vacant-lot farming will have a special interest to readers of a journal devoted to the art of cultivating the soil . . . In every city where this vacant-lot farming has been successful the soil has been cultivated in accordance with the teachings of science . . . Every process from the very beginning to the end was carefully supervised, so that this vacant-lot farming, apart from its direct pecuniary profit, had a much more important function as a school of agriculture . . .

We cannot but assume that many of these tenement-house farmers who have had the advantage of this year of schooling will discover that there is a happier and wholesomer life for them outside of the congested districts of great cities . . . [I]f, under capable instruction, agriculture can be made profitable in city lots, and if the good example of experiment stations is visible in better farming all about them, why should not actual instruction in agriculture be made a part of the curriculum of rural common schools? . . .

[Editorial. *Garden and Forest* 9 (1896): 91–92]

SENTIMENTALISM AND TREE-FELLING.

A writer in a late number of the *Springfield Republican* finds his sensibilities wounded by the tone of Mrs. Van Rensselaer's book, entitled, *Art Out-of-doors*, and especially by the advice to cut down trees, given in the chapter entitled "A Word for the Axe." It is not our purpose to enter into any defense of the book, which must stand on its own merits, any farther than to say that we know of no work where more sound doctrine on the subjects treated is given in the same space. On several occasions, however, *GARDEN AND FOREST* has advised the cutting down of trees, and a good many of them, in pleasure-grounds and elsewhere, and have been met with this same protest made by the writer in the *Republican* that no true lover of nature would think of such sacrilege. Now, we have no inclination to retort upon a critic of this sort that his own love of nature may be conventional and fictitious. We have no doubt that this writer, and many other good people who are distressed whenever they see or hear of the felling of a tree, love nature most sincerely after a sentimental fashion. But we believe that many people, whose practices they condemn, love nature quite as sincerely, and in a much more robust, and certainly more intelligent, way . . .

[Editorial. *Garden and Forest* 6 (1893): 311]



Chrysanthemums.—It often happens after Chrysanthemums have done flowering that they are stowed away either under green-house benches where there is but little light, or in cellars where there is less, or are left out in the weather to struggle as best they can with the elements. Good Chrysanthemums cannot be had next year from stock subjected to such treatment. Growers who aim at fine plants and fine flowers are now giving their stock-plants the best attention; the weaker kinds are placed in a cold green-house or frame, close to the light, and they are never allowed to want for water; the stronger kinds have also good positions in airy frames or green-houses . . . *John Thorpe*. Pearl River, N.Y. [*Garden and Forest* 1 (1888): 523]

THE USE OF TREES AND SHRUBS WITH LEAVES OF ABNORMAL COLORS.

A Boston correspondent writes in a discouraged tone about the planting he observes in the suburbs of that city. It seems to him that popular taste is setting strongly toward *Prunus Pissardi* [a purple-leaved form of *P. cerasifolia*, or cherry plum], the Golden Elder [*Sambucus nigra* 'Aurea'], variegated *Negundos* [*Acer negundo*, box-elder] and the like. We have no doubt that too many trees and shrubs which are valued for the abnormal coloring of their leaves are used about Boston, and, in fact, about every other American city. Unless our own observation is at fault, however, the tendency of public taste, as a rule, is in the other direction, by which we mean that the people who plant nowadays are more inclined to follow the teachings of nature in this respect than they were a few years ago, when the tree agent, with his highly colored catalogues, was more pervasive and influential than he now is. The so-called foliage plants with brightly colored leaves and hues, set in patterns of various sorts, are certainly not as prevalent as they once were, and it is very evident that in American parks the use of shrubs and trees with streaked and spotted or vari-colored leaves is not as

profuse as it is in European parks. Perhaps, our correspondent in some afternoon drive has observed several glaring offenses against that quietness and self-restraint in planting which alone can make home grounds homelike, and this has depressed his spirits . . .

[Editorial. *Garden and Forest* 10 (1897): 301]

CHRISTMAS GREEN.

EVERY morning for a week past the steamboat Minnie Cornell, from Keyport, New Jersey, has come to her pier loaded with "rope" and "fancy green." "Rope" is the trade name for the cables made of Club-moss and occasionally of Hemlock spray, and used for looping into festoons or twining about columns in Christmas decorations. "Fancy green" includes the wreaths, stars and other designs, manufactured chiefly from the leaves of Holly, Laurel and Rhododendron, together with Mosses, green or gray, from Oak trunks and Cedar boughs, scarlet berries of the Black Alder, the bluish gray fruit of the Juniper, the scarlet and orange fruits of the Bittersweet, not to speak of Grasses dried and dyed in fearful and wonderful colors. The little steamer has more than once carried 60,000 yards of the festooning material, and 1,500 dozen stars and wreaths at a single trip, and the entire amount of "rope" brought to this market during the season would reach from New York to Boston. The very first Christmas green sold in this city came from Keyport. Some forty-five years ago the wife of a Monmouth County farmer gathered enough Ground Pine to fill a sheet with the four corners tied together, and shipped it on a sloop with her poultry. It proved a lucky venture, and ever since, the people of Monmouth County have held almost a monopoly of the industry, although both the species of Club-moss most largely used, *Lycopodium dendroideum* and *L. complanatum*, were practically exterminated from that region years ago. They are still abundant, however, in Connecticut, some parts of northern New York, and Massachusetts, and are shipped to New Jersey in such quantities that large dealers buy them by the ton, and the manufacture of these festal wreaths and cables gives employment to the wives and daughters of many farmers after the fall work on the farm is over.

The trade in Christmas-trees began in 1851, when Mark Carr yoked up his oxen and hauled from the Catskills to the steamboat landing on the Hudson two sled-loads of young Balsams, and paid a silver dollar for the privilege of selling them on the corner of Vesey and Greenwich Streets. At least 150,000 trees have been piled up along the docks of the North River during the last week, and since the days of Mark Carr many a dealer has been glad to pay a hundred dollars for a corner privilege for holiday trade in Christmas trees. About half of the trees this year come from Maine, the remainder from the Berkshire Hills, the Black River country in the Adirondacks, and the Catskills. Good trees in the Catskills are becoming scarce, however, and the woodsmen of those mountains are looking elsewhere for their material. Short jointed, stocky trees with perfect whorls of branches at the base of each annual growth, are the most sought for, and the Maine trees, as a rule, command rather higher prices than any others. The trees come up thickly where hardwood timber has been cleared away, and if they are cut above the second or third joint, one of the limbs soon turns upward and becomes a leader to furnish another Christmas-tree. In this way the same land is cut over several times. Fortunately the

Balsam Fir is about as nearly worthless for any other purpose as any of our native trees, and therefore the waste of cutting so much young timber is not serious. A few Black Spruces come among the Firs, and Hemlock boughs, which, oddly enough, are made to do duty as Palm branches in some church services [and] are in growing demand every year. Trees from Maine are shipped as far south as Baltimore; and of late years large quantities of Holly branches, mostly from Maryland, since the limited supply in New Jersey is nearly exhausted, are sent as far north as Boston. Within two or three years the Mistletoe has been sold here in a few shops and even on the streets, but in spite of its association with Christmas festivities in Old World traditions, it has filled but a small place here in the regular market of Christmas green. And yet this parasite is common on the Gum trees of southern New Jersey, and it is never so beautiful as at this season with its transparent berries clustered among its evergreen leaves.

[Editorial. *Garden and Forest* 1(1888): 505-506]

PLANT NOTES. JAPANESE IRIS.

ONE of the most attractive features in Mr. John L. Gardner's beautiful garden in Brookline, Massachusetts, is the bed of Japanese Iris (*Iris laevigata* or *Kaempferi*), which forms the subject of our illustration. The plants, which were selected in Japan with great care by Mrs. Gardner, represent the best named Japanese varieties. They are arranged according to color, in the Japanese fashion; each



A Bed of Japanese Iris.

row across the bed consisting of one variety, those with white flowers at one end, and then all the intermediate shades to the dark blues and purples at the other end. The bed is sunk eight or ten inches below the surface of the surrounding lawn, and is furnished on one side with a perforated water-pipe so that the plants can be irrigated during the growing season. It is eighteen inches deep and consists of a rich compost of loam and thoroughly rotten cow-manure, and every year it gets a good top dressing of manure. Every pleasant morning after the middle of May the water is turned on at nine o'clock and allowed to run till three or four o'clock in the afternoon; by that time the bed is thoroughly saturated and covered to a depth of two or three inches with water; the supply is then shut off until the next morning. Some of the varieties, under this generous treatment, grow to a height of five or six feet, and have produced flowers fully ten inches across, and surprising in their profusion and beauty. While irrigation is doubtless necessary to develop the greatest perfection of the Japanese Iris, it can be successfully grown in this country in ordinary seasons in any good garden soil and without artificial watering. Very fine flowers have been produced without special treatment by Mr. [Francis] Parkman and other American growers, who have raised good seedling varieties of this plant without giving to it more care than is required by other Irises . . . The flowers are hardly surpassed in delicacy of texture or in beauty of color, but they do not appear here until July, and the hot sun soon fades them. The blooming season may be prolonged by the use of an awning placed over the beds during the day, but it cannot be denied that this plant flowers too late here, and that its period of beauty is too short in this climate ever to make it a great popular favorite . . .

[*Garden and Forest* 1 (1888): 259–260]

NEW OR LITTLE-KNOWN PLANTS. XANTHOCERAS SORBIFOLIA.

TO Mr. Paul Dana we are indebted for the opportunity of publishing in this issue the portrait of a remarkably fine specimen of the rare *Xanthoceras sorbifolia* in Mr. Dana's collection at Dosoris [Long Island, New York].

Xanthoceras sorbifolia is a small tree of northern China, related to the Bladder-nuts [*Staphlea*] and Horse-chestnuts, and interesting as the only representation of the genus to which it belongs, and which owes its name to the presence between the petals of curious yellow horn-shaped glands. It is one of the most attractive of the hardy plants which our gardens owe to northern China, the region from which many of the most beautiful trees and shrubs in cultivation have been brought. It is a leafy, glabrous or puberulous plant with opposite pinnate leaves eight to twelve inches in length; the leaflets are alternate, linear-oblong, acute, coarsely serrate, dark green and glossy on the upper surface and pale on the lower. The flowers are white, handsomely marked with red streaks at the base of the petals, and are produced in great profusion in lateral racemes eight or twelve inches long, appearing as the leaves are unfolding. The fruit, which is a globose or pear-shaped capsule, not unlike that of some of the smooth-fruited Horse-chestnuts in general appearance, finally splits into three valves, and contains a number of globose, nearly black, shining seeds half an inch in diameter.

Xanthoceras was discovered nearly sixty years ago by the German botanist Bunge, who accompanied a Russian mission which traveled overland from St. Petersburg to Peking; it was not, however, introduced into our gardens until nearly forty years later, when the French missionary David sent it to the Jardin des Plantes, in Paris, where the original plant may still be seen.

In spite of its hardiness and the beauty of its flowers, Xanthoceras is still rare in American and European gardens. This is, perhaps, due to the fact that,



Xanthoceras sorbifolia, at Dosoris, Long Island

although it is hardy against cold, it is evidently fastidious and does not grow well in all soils and situations. Most of the plants which have been tried in this country have perished sooner or later, and it is unusual to find either here or in Europe so large, vigorous and healthy a specimen as the one at Dosoris.

From the Abbé David's notes we learn that *Xanthoceras* is a tree fifteen to eighteen feet high, and exceedingly rare in those parts of China and Mongolia which he visited; that it is cultivated in the gardens of Pekin; and that the seeds are eaten by the Chinese.

At our request, Mr. Dana has sent us for the benefit of our readers the following note upon his method of cultivating *Xanthoceras*, which we hope will now become a more common object in our gardens:

"I first saw a plant of *Xanthoceras* at Baden-Baden on the grounds of Herr Max Leichtlin about the year 1884. I admired it, and Herr Leichtlin spoke of it as a new plant of great promise, which he felt sure would be an acquisition to horticulture. I secured two plants, and have been cultivating them now for eight or ten years. They are six feet high, and grow in rich warm loam. They have no protection whatever, and yet they have never lost a branch in winter, and they endure our dry summers perfectly. They are not strong-growing shrubs, but they bear flowers in great profusion, and are more beautiful when in bloom than at any other season. They ripen seeds every year, and I would be glad to furnish some of them to any one who cares to test the plant."

[*Garden and Forest* 6 (1893): 284-286]

CLIMBING PLANTS ON BOSTON BUILDINGS.

PROBABLY nowhere else in this country does the service performed by climbing and clinging plants in clothing and adorning the walls of buildings receive such good illustration as in and around Boston. *Ampelopsis tricuspidata* [now *Parthenocissus tricuspidata*] was first domesticated here, and has so long been a striking feature of this city as to gain for it throughout the country the familiar name of "Boston Ivy." This name, however, is seldom heard here, where it is most commonly known as the "Japanese Ivy" or the "Japanese Ampelopsis."

Ampelopsis tricuspidata had probably been cultivated hereabout for several years before it became particularly noticeable, but its popularity dates back to the Centennial year of 1876. Although for years familiar with all parts of the city and a close observer of such things, I had never noticed this plant until my return in 1877, after an absence of a year or so, when I was at once struck by its prevalence. It did not become remarkably common hereabout until about 1880. Now, however, it is seen everywhere, and is even more prevalent than its cousin, our beautiful native Virginia Creeper. It has become as characteristic of our city and suburban scenes as the White Pine is of our rural New England landscape, and one of our foremost authorities once told me that he regarded it as the greatest horticultural acquisition of the century.

Occasionally its use is excessive, but its luxuriant habit is seldom encouraged to an undesirable extent. This is probably due to the fact that one of its most conspicuous services consists in the concealment, or the amelioration, of architectural ugliness, and, fortunately, the people most liable to employ it to excess are generally the ones most responsible for bad architecture. Ugly objects are so

generally made graceful and picturesque by the kindly offices of the Japanese Ampelopsis that the instances of its over-liberal use are usually merciful concealments. The Japanese Ivy, or, still better for this particular purpose, the Virginia Creeper [*Parthenocissus quinquefolia*], could be usefully employed to drape the electric-wire poles, whose gaunt interminable processions make hideous the highways throughout the country, and convert them, for a large portion of the year, at least, into objects of beauty, if the necessities of the linemen, with their climbing-spurs, did not forbid. This might, however, be done with poles that require no climbing, as the posts that support the trolley-wires of the electric-railways, particularly along a road that has been adorned with central-lawn spaces, like the boulevards of Beacon Street or Commonwealth Avenue.

As a means for the mitigation of bad architecture, the Japanese Ampelopsis on our Museum of Fine Arts [then located on Copley Square] furnishes an instructive example, though it is not carried far enough. It clambered bravely over the ugly walls of parti-colored terra cotta and brick, and for a while so nearly effaced the unspeakable reliefs of the second story as to give them the charm of indefiniteness. But the trustees have since restricted the creeper to the first story . . .

Probably the building most famous for its exuberant, but not in the least excessive, growth of Ampelopsis is the Old South Meeting-house, where it creeps over an enormous expanse of gray old walls and high up on the tower, relieving the severity of the Puritan architecture with its gentle touch. The suggestion of nature amid the piles of neighboring brick and stone in the heart of the business section of the town does much to heighten the charm of the Old South's garb of greenery. And this leads me to express dissent from only one point in the admirable editorial on the general subject of the use of clinging growths in combination with architecture that appeared in *GARDEN AND FOREST* a few months ago. The New York Post-office was instanced as one of the buildings where such a growth would not be in place. But to my mind it would be peculiarly appropriate there, for the reason that the architecture of that building is intensely offensive. If, by any means, an ample growth of Ampelopsis or any other creeping things could only be coaxed to embower a goodly portion of its façades, it would not only mitigate the inartistic character of the edifice, but it would serve to unite it with the remnant of the neighboring City Hall Park, from which its site was unrighteously taken, and in a measure atone for the perpetual affront of its existence . . .

One of the few redeeming features of our extravagantly praised Public Garden is the growth of Virginia Creeper and Japanese Honeysuckle, that converts the iron fence on the western side into a beautiful hedge, and the Japanese Ampelopsis that covers some of its stone posts. This creeper would perform an inestimable service if it were allowed to clamber at will over the bad sculpture in the Public Garden and the Common.

The value of trailing growths for fences is not appreciated in this country as it should be. In Germany the Virginia Creeper is put to simple and effective use for this purpose in urban public grounds. A light, low fence is made of stakes and connecting wires; the Virginia Creeper is trained up each stake and made to form graceful festoons between. Its employment in some such fashion would do good service on a place like the Cambridge Common, for instance, now a bare, unattractive expanse, having a sort of kinship with the New England rustic burying-

ground. It is surrounded by a fence composed of unhewn granite posts with squared rails of wood between. Virginia Creeper, Japanese Ampelopsis, and perhaps other twining or climbing plants, might convert this old fence into a thing of beauty. In public parks the requirement for protection of the borders sometimes necessitates guards of wire and stakes along the paths. These are often great disfigurements, and their offensive aspect, in places where they seem to be required permanently, might be at least mitigated by the use of Virginia Creeper after the German fashion . . .

Boston.

Sylvester Baxter

[*Garden and Forest* 7(1894): 432-433]

THE FLOATING GARDENS OF MEXICO.

THE famous chinampas, or floating gardens, are a never-ending attraction of the City of Mexico, and yet little is known to the general reader regarding these curious places. Contrary to the general belief, the so-called floating gardens of the present day do not float. Many years since, however—in fact, before the conquest of Mexico by the Spaniards—the name was appropriate, for real floating gardens were then common on the lakes in the Valley of Mexico, especially in the immediate vicinity of the city. But when Humboldt visited Mexico (then called New Spain) in 1803, and Abbé Francesco Clavigero (a missionary among the Indians) a few years later, these peculiar possessions of the Mexicans were rapidly diminishing in number; and in 1826 Captain G. F. Lyon informs us that “the little gardens constructed on bushes or wooden rafts no longer exist in the immediate vicinity of Mexico (the city); but I learned that some may yet be seen at Inchimilco.”*

Abbé Francesco Clavigero describes the true floating gardens as follows: “They plait and twist Willows and roots of many plants, or other materials, together, which are light, but capable of supporting the earth of the garden firmly united. Upon this foundation they lay the light bushes which float on the lake, and over all the mud and dirt which they draw from the bottom of the same lake.”†

The common form was a quadrangle, and the average size about fifteen by forty feet, although some of the largest were a hundred feet in extent. Many of the latter contained a small hut, in which the cultivator sometimes lived; one or more trees were also growing in the centre of these largest plots. The earth used was extremely rich, and this being kept in a moist state by its proximity to the water (the elevation above it being not over a foot), the gardens were productive of the choicest vegetables and flowers, including also Maize.

The gardens of the present day are very different affairs. They do not float, but, on the contrary, are composed of strips of solid ground, usually about fifteen by thirty feet in extent, although some are larger. These plots are intersected by small canals, through which visitors are propelled in canoes. They are constructed by heaping up the earth about two feet above the water. Willows, and sometimes Poplars or Silver Maples, also a species of Cane, are often grown along

* *Journal of a Residence and Tour in the Republic of Mexico in 1826*, vol. ii.

† *History of Mexico*, 1807, vol. ii.



their banks to keep them from washing down. The nearest gardens to the City of Mexico are along La Viga Canal, a public waterway about forty feet in width and of varying depth. Its source is Lake Texcoco (formerly known as Tezcucotl), two and a half miles west of the city, from whence it flows to a point near the town and then returns by a circuitous route to the lake. The gardens are located where the ground is naturally low or swampy.

All produce the choicest vegetables, flowers, and not infrequently fruits, in great abundance, embracing nearly every variety grown in the United States, and others unknown to us. Even in the ditches or little canals beautiful Water-lilies often line the way, while many of the plots are one mass of vari-colored flowers, the most common ones being Roses, Pinks, Geraniums, Poppies and Fuchsias. The great variety of shades and the enormous size of many kinds astonish and delight the visitor from more northern latitudes. The Poppies are more attractive than our finest Pæonies; on certain feast days every one wears a wreath made exclusively from these showy flowers.

The quick and luxuriant growth of the products is mainly due to the daily application of water, which is dipped up in gourds attached to long swinging and pivoted poles, and deftly thrown about. It is needless to say that the cultivator never depends upon rain. Some of the plots are occupied by their owners and their families, who live in charming little houses constructed of cane, and surrounded by all their possessions, often including cows, horses, pigs and chickens. La Viga

Canal is almost impassable on Sundays especially, and the same may be said of the beautiful driveways along its tree-lined banks; for Sunday in the City of Mexico is the liveliest and, in many respects, the busiest day of all the week. It is the great market day as well as holiday, and a large number of the craft on La Viga are loaded with produce of every description from the gardens and elsewhere. The visitor to the floating gardens seldom hides his disappointment on discovering that they are stationary, but he never regrets having visited them; indeed, a day spent on the canal and among the chinampas will long be remembered as one of the pleasantest in Mexico.

Little is certainly known regarding the origin of these famous places. Abbé Clavigero says that when the Mexicans were driven from their native country, ages in the past, they were forced to occupy small islands in Lake Texcoco, where "they ceased for some years to cultivate the land, because they had none, until necessity and industry together taught them to form movable fields and gardens, which floated on the waters of the lake. . . . These were the first fields which the Mexicans owned after the foundation of Mexico." The custom may have originated as above stated, but the following view, founded on a careful examination of some of the oldest works on Mexico, is advanced as the more probable, especially since the Mexicans still retained and cultivated the watery plots after their independence was again established.

For long ages the Valley of Mexico was subjected to devastating inundations. The valley is about sixty miles in diameter, and is surrounded by a continuous wall of hills and mountains. The waters collected on these flow into six principal lakes. The plaza mayor, or great square, in the City of Mexico is elevated a few inches only above the nearest lake—Texcoco. In former times, a prolonged rainy season caused the surplus waters in the other lakes—which have an elevation of from three to thirteen feet above the plaza mayor—to burst their banks and flow into Lake Texcoco, which in turn overflowed and flooded the valley. In June, 1629, the date of the last great flood, the city was covered with water to a depth of three feet, and it remained in that state for five years.

The regular fields were, of course, ruined whenever a freshet traversed the valley, and necessity finally compelled the people to depend upon floating gardens for a supply of produce at all seasons, and to prevent a famine. These were moored in places where the rise and fall of the lake waters would not affect them. During the period when floods were looked for at any time, these floating patches were very common, but when the city and valley were partially protected by a gigantic canal in 1789 (commenced in 1607*), by which the main overflow was carried off in safety, they gradually disappeared, until at the present time nothing but the pretty name and stationary plots surrounded by water remains to perpetuate an ancient custom.

Washington, D.C.

Charles H. Coe

[*Garden and Forest* 8 (1895): 432–433]

* The drainage canal, commenced by the Aztecs, has been greatly improved and only recently finished by the Mexican Valley Drainage and Canal Company, so that all surplus water and the sewage of the city is now completely carried off.

NOTES.

It is stated that Mr. Ruskin maintains a Cherry-orchard solely for the benefit of the birds on his estate. [5 (1891): 36]

Forty-six Japanese gardeners are now employed, it is said, in California, where it appears that the taste for Japanese fruit and ornamental trees has greatly increased. [2 (1889): 180]

The last English census enumerated about 5,000 women who are professional gardeners in that country, and six who are employed in superintending the drainage of towns. [7 (1894): 10]

The health officer of San Francisco recently examined eight samples of fruit jellies bought in the open market, and not one of them proved to be made of sound ripe fruit. Several apple jellies were colored, while one in tin contained turnip pulp, colored with aniline dye to represent strawberry jelly. [9 (1896): 290]

The latest atrocity in the way of "fashionable" floral arrangements is a muff composed of flowers, for the use of bridesmaids at weddings. People seem slow to learn that there is a right way and a wrong way to use natural flowers, and that all ways are wrong that force them to simulate the form of some article of dress or ornament. [2 (1889): 180]

It has been suggested that instead of the present plan of distribution of free seeds by the Government that the Department of Agriculture should issue legal-tender notes which Congressmen could distribute among their constituents, so that each one could purchase the particular kind of seeds or flowers or shrubs or trees he needed. Why not? [10 (1897): 190]

At this season, wherever any planting is done for beauty or for use, a little ground should be set apart for the children in every home. The possession and cultivation of a miniature garden will do much to cultivate habits of observation, turn the attention to the mysteries and beauties of plant-life and develop a taste which will be a fruitful source of pleasure in after life. [7 (1894): 140]

A correspondent inquires how much land it would require to furnish strawberries enough to supply an average-sized family. We should say that such a family might have in an average year all the fresh berries needed during their season, besides a few for canning, if five or six rows of plants a hundred feet long were set out and cultivated with rather more than average care. [7 (1894): 330]

The people of California are to be congratulated upon Professor Hilgard's decision to refuse the position of Assistant Commissioner of Agriculture, offered to him by the President, and to remain the Director of the

California experiment station where he can accomplish infinitely more than he could do in Washington, under the demoralizing political influences which beset the Department of Agriculture. [2 (1889): 180]

A woman in Brooklyn who visited the grave of a deceased relative in Cypress Hills Cemetery, some months ago, alleges that she was poisoned by *Rhus Toxicodendron* [poison ivy] which had been allowed to grow in her lot. She has sued the cemetery association for \$10,000 damages on account of the sufferings which she has since endured. This gives rise to some very interesting questions as to the responsibilities of corporations who control cemeteries. [8 (1895): 430] [In 1897 the plaintiff was awarded damages in the amount of \$3,400.—Ed.]

A writer in the *Southern Stockman* says to test the ripeness of a Water Melon, the thumb-nail should be drawn over it so as to scrape off the thin green skin. If the edges of the skin on each side of the scar are left ragged and granulated, and the rind under the scar is smooth, firm, white and glossy, the melon is ripe. If the edges of the scar are smooth and even and the nail plows into the rind in places and the skin does not come off clean, then the melon is green. Two melons, one known to be ripe and the other green, should be taken and this test practiced on them until the difference is plainly observed. [5 (1892): 600]

The French Government has made Professor C. V. Riley a Chevalier of the Legion of Honor as a deserved compliment for his effective studies in economical entomology. His researches have not only been of advantage to the farmers and fruit-growers of the United States, but he discovered that the phylloxera was an American insect and identical with the pest which had proved so disastrous to French vineyards. He also introduced into France the spraying-nozzle which bears his name, and which, with certain modifications, is used in that country to counteract the mildew of the vine. [2 (1889): 444]

At the late Chrysanthemum show in Philadelphia, Mr. W. K. Harris exhibited a plant upon which twenty distinct varieties had been grafted and all were in bloom at the same time. This suggests a new line of work, inasmuch as such plants would be objects of great popular interest at exhibitions, if a proper selection and arrangement of colors were made. It may be questioned, however, whether a plant bearing several different kinds of flowers possesses any value except as a curiosity. Whether some varieties of feeble growth would be improved if grafted on a more robust stock can be ascertained by experiment. [1 (1888): 480]

The early settlers of New Jersey were not slow to discover the peculiar value and uses of the cranberries

which grow in the swampy sections of the Pines. Mahlon Stacy, writing from West Jersey in April, 1680, to his brother in Yorkshire, says that from "May till Michaelmas we have great store of very good wild fruit, as strawberries and hurtelberries, which are like our bilberries in England, but far sweeter, and very wholesome," and he adds: "the cranberries are much like cherries for color and bigness, and may be kept till fruit comes in again. An excellent sauce is made of them for venison, turkeys and other great fowl. They are better to make tarts than either gooseberries or cherries. We have them brought to our houses in great plenty by the Indians." [7 (1894): 430]

We are sorry to learn that Mr. C. M. Atkinson, one of the best all-round gardeners that America has seen, has been obliged, through physical infirmity, to retire from the charge, which he has held for nearly thirty years, of the gardens and estate of Mr. John L. Gardner, of Brookline, Massachusetts. This place has long been known to lovers of horticulture for its well-grown fruits and flowers, and especially for many of those old-fashioned hard wood greenhouse-plants which are so sadly neglected in most gardens of the present day, and which Mr. Atkinson grew to perfection. His skill, however, was not limited to any single field, and he was equally successful with Azaleas, Japanese Irises, Roses, Orchids, Violets, and all sorts of greenhouse and hardy plants. [8 (1895):30]

Professor [L. H.] Bailey and Mr. Wilhelm Miller have issued another bulletin on the *Chrysanthemum* which contains much that is of interest to florists and flower lovers generally. Mr. Miller's chapter entitled "*Chrysanthemums at Home*" is certainly worth publishing under the Nixon Act, and perhaps the horticultural knowledge which can be disseminated by investigations and publications of this character justify the use of the costly machinery of the experiment station in this particular direction. The question is whether it could not be used to better advantage elsewhere. But since the bulletin is published primarily for educational purposes, we must express our regret at the use of such a barbarism as "mum" for *Chrysanthemum*. A subject which is of sufficient importance to be discussed in a bulletin from a university ought to command the use of dignified and scholarly language. [10 (1897): 270]

In an interesting article, called "Waste Products Made Useful," published in the *North American Review* for November, Lord Playfair says: "As to perfumes, there are some which are really oils, and others extracted from flowers. There are others which are made artificially, and curiously, most frequently, out of bad-smelling compounds. The fusel-oil, separated out in the distillation of spirits, has a peculiarly nasty and sickening odor. It is used, after treatment with acids and oxidizing agents, to make the oil of apples and the oil of pears. Oil of grapes and oil of cognac are little more than fusel-oil largely

diluted. Oil of pineapples, on the other hand, is best made by the action of putrid cheese on sugar, or by distilling rancid butter with alcohol and oil of vitriol. This oil is largely used for making pineapple ale. Many a fair forehead used to be damped with 'Eau de Millefleurs' without knowing that its essential ingredient was got from the drainings of cow-houses, though now it can be obtained cheaper from one of the constituents of gas-tar. [5 (1891): 540]

Christmas gifts supplied by florists this year consisted almost entirely of boxes of cut flowers, violets and roses being the favorites. Large, deep-colored Marie Louise violets, their long stems allowing of loose, graceful arrangement, sold for as much as five dollars a hundred. Roses cost from three dollars to eighteen dollars a dozen, an extra quality of American Beauty commanding the outside price of three dollars each. Lilacs at twenty-five cents to fifty cents a spray, tulips at one cent each, and stevia at fifty cents for a small bunch, were specialties of the holiday season. Carnations were plentiful and cheap; some well-cultivated specimens of William Scott, measuring two and a half inches across, brought the extreme price of two dollars a dozen. The Orchid season is now fairly begun, and cut blooms of *Cattleya* at nine dollars a dozen, and *Cypripedium insigne* at four dollars a dozen, were in good supply. Fruited plants of *Ardisia crenulata* and the Otaheite orange were in some demand, and specimen plants of *Cyclamens* and of Chinese Primroses in ornamental baskets found considerable favor. But the most beautiful and the most costly were luxuriantly flowered plants of Heath, their foliage almost hidden under the myriad of tiny bells, and a few extra early pink and white Azaleas. [8 (1895): 10]

With the present issue, which completes the tenth volume, the publication of *GARDEN AND FOREST* ends. For ten years the experiment has been tried of publishing a weekly journal devoted to horticulture and forestry, absolutely free from all trade influences, and as good as it has been possible for us to make it. This experiment, which has cost a large amount of time and money has shown conclusively that there are not persons enough in the United States interested in the subjects which have been presented in the columns of *GARDEN AND FOREST* to make a journal of its class and character self-supporting. It is useless to expend more time and money on a publication which cannot be made financially successful, and must, therefore, sooner or later cease to exist.

Mr. J. H. Griffith, Room 106, Tribune Building, New York, is authorized to receive money due to the Company, and to attend to any other business matters which may arise in winding up its affairs.

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[10 (1897): 518]



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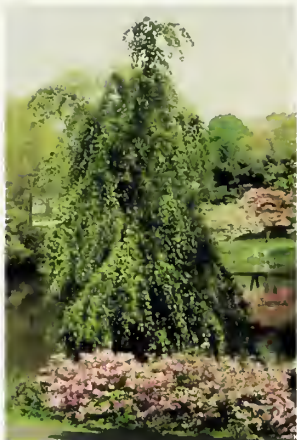
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Front cover: The “knees” of *Taxodium distichum*.

Inside front cover: A gallery of adaptable plants. First row, from left to right: *Stewartia sinensis*, *Liriodendron tulipifera* x *chinense*, *Aristolochia mandshuriensis*.

Second row: *Cercidiphyllum japonicum* ‘Morioka Weeping’, *Quercus phellos*, *Hydrangea quercifolia*.

Third row: *Abies koreana*, *Koelreuteria paniculata* ‘Rose Lantern’, *Rhododendron calendulaceum*.

Inside back cover: First row, from left to right: *Xanthoceras sorbifolium*, *Heptacodium miconioides*, *Hydrangea quercifolia*.

Second row: *Koelreuteria paniculata* ‘Rose Lantern’, *Stewartia sinensis*, *Hydrangea paniculata* ‘Praecox’.

Third row: *Rhododendron arborens*, *Enkianthus perulatus*, *Lindera obtusilobum*.

Back cover: *Betula platyphylla* seen through *Acer pseudosieboldianum* on Changbai Shan, north China.



Tree climber Jugah Tagi photographed on a giant strangler fig, *Ficus* sp. (Moraceae).

The View from the Forest Canopy

Richard Primack, Melvin Goh, and Meekiong Kalu

For decades, botanists from Harvard University and elsewhere have been studying the remarkably diverse flora of the rainforests on the island of Borneo. Much of this interest was sparked by Peter Ashton, former director of the Arnold Arboretum, who has been doing research in Borneo for over forty years. Through the years, many Harvard students, undergraduate and graduate, as well as postdoctoral and staff researchers, have traveled to Borneo to look for new plant species, to hunt for plants with medicinal potential, or to determine the environmental effects of logging. Others have pursued zoological interests. Tim Laman, an Arnold Arboretum Associate, combined his knowledge of the rainforest with his photographic skills to produce a series of articles for *National Geographic*, most recently one on gliding frogs, lizards, and snakes that live in the forest canopy. Cheryl Knott and Mark Leighton of Harvard's Peabody Museum have investigated the ecology of orangutans, monkeys, hornbills, and other large mammals and birds.

Whatever the subject being investigated, a key member of all these exploration teams in Borneo's rainforest is a person known as a "tree climber." Not surprisingly, a tree climber's official job is to climb trees and collect specimens of leaves, flowers, and fruits that are then dried and mounted on herbarium sheets for use in botanical research. The best tree climbers are also experts in camp craft and forest lore. Two of the most famous tree climbers in all of Southeast Asia, both of them well known to Harvard researchers, are Jugah Tagi and Banyeng Ludong, now in their fifties and recently retired from the Sarawak Forest Department. Sarawak, which is part of Malaysia, occupies the northwest coast of Borneo.

Both Jugah and Banyeng grew up in remote longhouses, the sort of single-structure villages on stilts that are common in Borneo. After their

childhood, they went to Kuching, the capital of Sarawak, seeking education and work. They both have the "burongs"—bird tattoos on their throats and star tattoos on their shoulders—that mark them as members of the rural Ibans (also known as the Sea Dayaks), but apart from that, they are very different in both appearance and personality. Jugah is short, weighing only around a hundred pounds, with an outgoing, fun-loving personality. In a group he is often the main talker, loudly telling stories in an excited, high-pitched voice. By contrast, Banyeng is barrel-chested, with a quieter, more reserved personality. He usually speaks more slowly and hesitantly, but occasionally he, too, becomes excited.

The Traditional Way of Climbing Trees

In their working years, both Jugah and Banyeng could climb virtually any tree in Sarawak's forest: few trees were too tall or too difficult for these two, who used the traditional methods they had learned from boyhood and refined while working for the Forest Department. The most common method involves an inchworm-like series of movements—grabbing a tree with the arms, raising the legs along the trunk, and gripping the trunk with their feet while extending the body another one to two feet up the trunk—movements repeated again and again until the top of the tree is reached.

When the trees were of ideal size for climbing in this way—about two feet in diameter—Banyeng and Jugah could scoot to the top in a minute or two. When the trees were smaller, or had slippery bark, they sometimes tied a rope around their ankles to increase the pressure of their feet against the trunk.

When the trunk of the targeted tree is too thick to hold onto, the traditional tree climber has to work from a smaller tree nearby. If the smaller tree is flexible enough, he might simply climb to the top branch and swing back and



Jugah Tagi demonstrates the techniques of traditional tree climbing.

forth until he can reach over, grab a branch of the larger tree, and leap across. Other situations require the use of a "penyulok," a forked pole up to thirty or thirty-five feet long to which another forked stick is tied with a vine to make a hook. For example, after climbing the smaller tree, the tree climber might haul up the penyulok into the tree using a long, rope-like rattan vine. He then extends the penyulok horizontally to hook a branch on the target tree and twists the branch until it breaks off and falls to the ground. In other cases the climber might build bridges between the two trees: after pulling up the penyulok and hooking it over a branch on the target tree, he ties the base of the penyulok to the smaller tree and crosses over it to the larger tree.

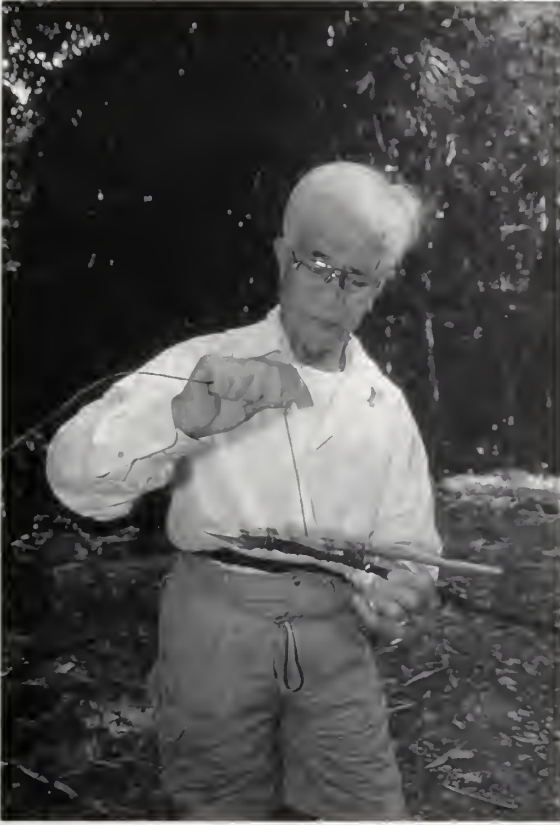
As one can imagine, these maneuvers, often performed hundreds of feet above the ground, require extraordinary strength and suppleness, as well as long practice. Jugah and Banyeng never used safety equipment even when climb-



ing trees more than 175 feet tall, relying on their own skill and confidence to avoid accidents. Today's young tree climbers, by contrast, make extensive use of tree-climbing spurs and belts and specialized rock-climbing equipment. This makes tree climbing much slower and more restrictive than the traditional methods.

But it also makes the climbing safer. Banyeng, who still does contract work with the Forest Department, comments on the danger inherent in his unusual profession: "There is always an element of fear when you are so high up, but the higher we go, the more careful we are. The few times that I have fallen it was because I wasn't careful enough, as I was not very high yet. My worst accident was near Melinau Gorge in Mulu National Park, where I not only fell out of a tree, but also rolled down a hill and got really banged up all over."

Paul Chai, at the time a Forest Department botanist and who frequently worked with visiting Harvard researchers, recalls this incident,



Constructing the hook end of a penyulok.



Maneuvering the penyulok into position.

and says that other members of the party thought Banyeng had probably been killed in the fall. When they dashed down the slope to find him, however, they discovered that Banyeng's main complaint was that he couldn't find his new clay pipe, which had fallen out of his mouth during his tumble down the hill.

"Daily-Paid" Tree Climbers: Two Careers Begin

In the early 1960s, when Jugah and Banyeng first signed up with the Forest Department as daily-paid tree climbers, they hardly expected to become full-time employees, much less



Using the penyulok to break off flowering branches from a neighboring tree.



A young Banyeng Ludong photographed beside the trunk of a *resak batu* tree, *Cotylelobium malayan* (Dipterocarpaceae).

recognized experts in their trade. Climbing trees came naturally to them; like other boys in their longhouses, they had learned tree climbing along with fishing, hunting, and farming. But both possessed unusual agility and curiosity, which made them well-suited to their future occupation.

The two men came to the profession through similar routes. In 1963, Jugah, then a young Iban from a longhouse on the Sut River, a tributary of the Kajang River, upstream of Kapit in central Sarawak. He met the well-known forester B. E. Smythies, of the Sarawak Forest Department, in Kuching, the state capital, where he had gone to look for work. Smythies' name was familiar to Jugah because a friend had worked for him in Brunei. Jugah managed to convince Smythies

of his abilities and his willingness to work hard, and that was the beginning of his career.

Jugah recalls the opportunity that Smythies' offer represented: "At that time, life at our longhouse was quite difficult. I helped on the farm and occasionally took rubber and wild fruits to Kapit, the nearest town, for sale. The journey itself was difficult then—a day's paddling from the longhouse to the town and a further two-day ride back upstream. When the offer was made of a job paying RM 4.00 per day [now just over one U.S. dollar], I grabbed it, since the amount seemed very big. I had no formal education as far as plants or trees were concerned. At first, all I knew was how to climb the trees and collect whatever plant specimens were needed."

Banyeng came from a longhouse on the Merit River, a tributary of the great Rajang River. He arrived in Kuching in 1957 and spent six years in a Chinese primary school. He too met B. E. Smythies and applied for the job of daily-paid tree climber. He was soon hired, as he came highly recommended by Robb Anderson, the great authority on Southeast Asian peat swamp forests. "To get

RM 4.00 a day then was quite a good pay," recalls Banyeng, now the father of four grown children. "I think that I was hired because I was very interested in the job, and I grabbed the offer, as it was not that easy to get a job without many skills."

It quickly became evident to both men that they would need to learn a great deal in order to succeed at their new profession. Jugah tells of a conversation he had with Peter Ashton, then working as a Forest Department botanist: "He asked me if I knew the names of the plants or trees we were collecting from, and when I said no, he looked at me with disbelief and chided me for my lack of knowledge. It was, according to him, a necessity for me to at least know the local names of the plants. This was one of the

skills required of tree climbers, to know the names the local communities gave to the plants.

"I knew that what he said was true and correct. I had to know the names, not only for myself but also because of what I was doing. With little education and knowledge, I realized that if I were to be good at what I do, I had to master some of the skills needed in the trade. Over the years, I learned the local names of the plants and trees. For many trees, I also learned the species and family names used by plant experts."

Outdoing Botanists at Their Own Game

Indeed, both Banyeng and Jugah are storehouses of botanical knowledge. Through years of working with local botanists and foresters, as well as with visitors from Harvard and other universities, Jugah and Banyeng have come to know the names of hundreds of tree species, and often their scientific Latin names as well. When they are not able to identify a species, they can usually recognize the family to which the tree belongs, or the species it is related to.

So proficient are they that they can often remember where they first saw a particular species, a huge help in field identification. And in contrast to most trained botanists, who must study plants carefully before venturing an identification, Banyeng and Jugah can name plants on sight with incredible speed. At Bako National Park, Jugah used to play a game with botanists, who would show him a leafy branch for five seconds and then hide it from sight. If Jugah knew the species, he would say the name instantly. To make the game more challenging, the botanists showed the branch for only three seconds or even one, and the result was the same—if Jugah knew the species, he needed only the briefest glance to recognize it. But his skills went even farther, he could be shown two or even three branches mingled together, all of different species, and still identify them instantly. In addition to being expert at field identification, both Banyeng and Jugah are repositories of knowledge about the ways villagers use each part of a tree species—for construction, medicine, rope, or food—and which animals eat the fruit, leaves, or bark.

Jugah and Banyeng eventually taught practical field identification to dozens of other Forest



J. DRANSFIELD

*Banyeng holding a fruiting branch of a sabal palm, *Pinanga tomentella*.*

Department staff and visitors. Paul Chai, now working with the International Tropical Timber Organization, recalls how Jugah and Banyeng would begin by showing newcomers a leafy branch. Then, over the course of days and weeks in the field, they would reduce the learning cues to a single leaf, then part of a leaf, and finally only part of a rotten leaf. These lessons were always taught in good humor and accompanied by lots of laughter at each stage.

The Care and Feeding of Scientists

Probably the tree climbers' most important job is to keep the research scientists alive in the field, particularly when the scientists are visiting Borneo for the first time. Between the two of them, Jugah and Banyeng have saved the lives of numerous inexperienced biologists, including one of the authors, Richard Primack.

Primack recalls a Harvard-sponsored expedition in 1981 to Mulu National Park, at that time still a wild and remote area, when Jugah saved



Jugah helping to identify branches at Bako National Park.

him from a serious accident or death: "On one of the evenings, while Jugah was setting up a camp on the side of Mt. Mulu, I crossed a shallow, rock-filled stream to a little island, about a hundred feet long by fifteen feet wide, on which were growing some unusual shrubs and vines that I wanted to collect. I noted that above me the mountain was draped in black rain clouds, but I didn't give it much thought. As I was collecting plants, I saw Jugah gesturing at me urgently, but I couldn't hear what he was shouting due to the rising roar of the stream. From the look on his face I could see that something was terribly wrong.

"Deciding I had better see what Jugah wanted, I was preparing to cross the twenty-foot stream to where he was standing when I saw that most of the rocks were now covered by the surging stream. As I watched, the water was getting visibly higher! Suddenly, I realized that a flash flood was coming. I struggled to the middle of the stream but couldn't keep my footing in the strong, knee-high current that covered the slippery rocks below. I was fighting just to keep standing in the rush of oncoming water. Just then, Jugah dashed into the stream and hauled me out onto the bank, despite the fact that I outweighed him by sixty pounds. Within the next few minutes, the water level in the stream

rose another two feet, covering the little island and the place where I had been innocently wandering about only minutes before."

Another life-threatening incident involved an American biologist who had come to collect snakes on the Sarawak coast with Jugah and other members of the Forest Department. "He was quite inexperienced in catching snakes, as it turned out," Jugah recounts. "A boat dropped us off in the afternoon in the Santubong area. We were planning to collect snakes at night, with the boat picking us up the next morning. The American told us that he was interested in

collecting king cobras and other poisonous snakes. I told him that these were very dangerous snakes and that he should let me catch them for him, or he should at least wear gloves. Before long we caught sight of a poisonous snake near some bushes. Saying he didn't need our help, he brushed us aside. Despite our warnings, he insisted that he was capable of catching the snake himself with his bare hands. As he reached for the snake, it bit his hand, and as he struggled to grab its head, it bit him a second time.

"Finally, hearing our screams, he flung the snake into the forest. He asked us how serious the bite was. I told him, 'You are going to die unless you go right to the Kuching Hospital,' and he then asked me what was the fastest way to the hospital. There was no road to the coast then; we had reached the place by boat but it was not due to pick us up until the next day. By then, he would have been long dead from the snake's poison! Luckily for him, we managed to find a fisherman who had just returned from his fishing trip and was willing to take us back to Kuching. But the fisherman was asking RM 50.00 to ferry us to Kuching, which seemed very high. The American didn't seem too pleased about the high price and asked me what I thought of the situation.

"It's quite simple," I told him. "Either you pay him or we wait for our boat tomorrow. Only by then we will be carrying your dead body with us." Upon hearing that, he made no further fuss, and we arrived in Kuching just in time to get treatment for the bites." Jugah laughs as he finishes: "The American left Sarawak without going out snake-collecting again."

Another crucial role played by tree climbers is that of supplementing their expeditions' limited supply of tinned meats with fresh meat. Jugah and Banyeng are highly skilled fishermen and hunters and often welcomed the opportunity to use these skills while on field trips. In the early days, any animal could be shot for food, but awareness of the need for conservation later resulted in restrictions against hunting monkeys, hornbills, and other endangered wildlife. This often meant that the tree climbers faced conflicting demands: the need to follow the new restrictions on the one hand, and the need to supply food for expedition members on the other.

Fortunately, even if the hunting wasn't good, there were always fish to be caught. Mountain streams often produced a large supply of small fish, albeit full of bones. Any pole with a bit of string, a fishhook or a bent nail, and a small berry or insect as bait would suffice for fishing gear. Lee Hua Seng, associate director of the Forest Department and a frequent visitor to the forest, recalls that Banyeng had a special talent for catching freshwater carp using a fishing rod fashioned from the midrib of a palm frond, with a grasshopper tied to its end for bait.

Richard Primack also recalls one memorable evening in 1986 when he was working with a student, Pamela Hall, and Forest Department staff at the remote Bukit Mersing Protected Forest, way upriver and a long walk into the forest. One night everybody was sleeping in the streamside camp except Jugah, who was out hunting. When a gunshot echoed through the forest, everyone woke up. About twenty minutes later, Jugah emerged from the dark forest carrying a dead porcupine the size of a basketball. The men heaped up the campfire with wood and threw the porcupine on it to burn off the quills. The experience of sitting around a huge fire at eleven o'clock at night on a remote

Borneo mountain, with clouds of burning porcupine smoke rising in the air and sparks flying from the crackling quills, will definitely not be forgotten soon.

Tree climbers are also responsible for setting up camps in remote locations, making sure the camps are safe, functional, and if possible, comfortable. The basic camp consists of a framework of poles over which tarps are stretched to keep out the rain. Simple cots covered with mosquito netting serve as beds. Often, the tree climbers are asked to improvise special structures, such as a writing desk and chair for a scientist, or a temporary shelter of palm leaves when a sudden rain shower erupts.

Banyeng and Jugah learned that their knowledge of camp craft was not always heeded, however. Banyeng often worked with Peter Ashton, and Banyeng recalls that while Ashton was brilliant as an administrator and biologist, he sometimes chose not to listen to advice. "During one of our collecting expeditions along the Baram River he insisted on pitching his tent along a riverbed despite repeated warnings from us. The rainwater that fed the stream eventually rushed down the slope later that evening and washed away his tent, leaving him cursing and fuming over the situation," Banyeng remembers, laughing.

Today there are still tree climbers in the Forest Department collecting tree branches for botanical projects and also gathering fruits and seeds for various replanting projects. But these young tree climbers, with their special climbing shoes, belts, and ropes cannot easily move around in the forest because their equipment is so heavy and cumbersome. Climbing with the new gear is slow and tiring in comparison with the speed with which the young Jugah and Banyeng bounded up trees with no equipment at all. Those days are over for the tree climbers, the Forest Department, and the visiting researchers, but the vivid memories remain.

Richard Primack is a professor of plant ecology at Boston University and was recently a Bullard Fellow in the Harvard University Herbaria. Melvin Goh is a reporter for the *Sarawak Tribune*. Meekiong Kalu is a research officer for the Sarawak Biodiversity Centre.

Survival of the Most Adaptable

Peter Del Tredici

Botanic gardens and arboreta are great places for the adventurous gardener to explore for plants and new ways to use them. Tucked into out-of-the-way, often untidy corners one can find plants that are refreshingly different from those offered by the trendy horticultural industry or seen in our monotonous suburban landscapes. Often these plants have been underutilized because they cannot meet the demands of a horticultural marketplace that requires rapid turnover. Botanic gardens, by contrast, are islands of stability where plants can grow and develop at their own pace. This is especially important in the case of trees, which can be very slow to develop, often taking fifteen to twenty years to produce flowers or cones.

A brief summary of how plants become part of botanic garden collections will illustrate the value of these collections for the gardener interested in expanding his or her horticultural options. To begin with, the source of the plants is an important part of the process. Botanic gardens, particularly those with a research mission, go to great lengths to obtain plant material that has been collected in the wild and documented with herbarium specimens. This expensive and time-consuming documentation ensures for future generations that our plants are properly identified. And that represents only the beginning of the plant documentation, which consumes a significant portion of the Arboretum's living collections budget.

In contrast, there is no way to know for certain that a plant in a nursery is what the label says it is. Indeed, most nurseries raise their plants from very small seedlings or cuttings that they purchase, and they use the identifications that come with them. If the seeds were collected from the wild (and correctly identified), the seedlings will be true to type. If the source nursery made an identification mistake, however, the error will spread throughout the industry.

After seeds have been collected in the wild and received at the greenhouse, they are chilled or scarified before being sown. When and if they germinate, the resulting seedlings are potted up. Once they reach an appropriate size in the nursery, which differs widely from garden to garden, they are labeled and planted out in permanent locations where it is hoped they will flourish. The plants are watered and weeded during their first year or two on the grounds, but after that they are generally left to develop in their own good time, under conditions that might be called "benign neglect." The whole process, from seed to being planted out on the grounds, is long, taking three to five years for shrubs and five to seven for trees.

The purpose of this article is to highlight some noteworthy plants that have made it through the cultivation process at the Arnold Arboretum but are still not common in the landscapes and gardens of the Northeast. Some of them can be considered new, having only recently become available commercially, while others are not currently available through nurseries even though they have been growing on the Arboretum grounds for over a hundred years. The latter group includes plants that have always been ignored by the nursery industry, and others that may have been popular in the past but have fallen out of favor and are now essentially forgotten.

Most of the plants on the list are adaptable to a wide range of environmental conditions, growing well in either full sun or partial shade, and on wet or dry sites. All of them have performed well on the Arboretum's well-drained, acidic soils, and most have few, if any, pest or disease problems. Keep in mind, however, that this characterization is based on a small sample size and may not hold true if the plants become widely planted. It should also be noted that the USDA hardiness zone ratings, as well as the

sizes of the plants, are meant as guidelines rather than as absolute judgments.

While most of the plants have multiseason interest, I have organized the list around their primary season of interest. The list is heavily weighted toward species rather than cultivars, for two reasons: first, many of the plants have not yet undergone intensive horticultural selection in either nurseries or landscapes, so no cultivars are available; and second, the primary criterion for selection was ecological adaptability, which is best treated as an attribute of the species as a whole rather than of a particular cultivar.

Selecting plants with broad adaptability may be the best approach to one of the gardener's primary goals: choosing the right plant for the right place. Unfortunately, highly adaptable species can also be highly invasive; the trick is to identify species that are adaptable but not invasive. The amur cork tree (*Phellodendron amurense*) is an example of a species that has the potential to become an invasive if it becomes widely planted in the Northeast. It is an unfortunate conundrum that every plant, including *Stewartia pseudocamellia* and *Acer palmatum*, has the potential to become invasive when growing conditions allow its seedlings to get established.

My reasons for assembling this list go well beyond an interest in seeing greater variety in our local landscapes. Our physical environment is changing rapidly—in large part because of human activities—and there is an urgent need to identify plant species that can thrive alongside people and the pollution we inevitably create. The plants listed below have performed reliably under a variety of environmental conditions with minimal maintenance and little supplemental irrigation; they can therefore be considered “pre-adapted” to flourish under the erratic weather extremes that global warming appears to have in store for us. I hope this eclectic sample of ornamentals will not only encourage horticultural

experimentation, but also get more people thinking in practical terms about the impending changes in our environment.

SPRING

Aristolochia manschuriensis (Manchurian dutchman's pipe): zone 4 (?). This rarely seen vine produces three-quarter-inch-long yellow flowers early in spring before the foliage emerges, making it much showier than the American species, *A. macrophylla*, whose flowers are hidden under fully expanded leaves. While the two species are similar in growth rate and habit, the leaves of the Manchurian species are somewhat larger and a duller green than those of the American species.

Chionanthus retusus (Chinese fringetree): zone 5. Chinese fringetree is more tree-like than its straggly American cousin, *C. virginicus*. In May or June, the whole plant is covered by small, white flowers, followed by a large crop of blue-purple fruit in fall. When planted in an open situation, Chinese fringetree will develop into an elegant specimen about thirty feet in height with a similar spread. It has a broad distribution in Asia, where it shows considerable variation in hardiness, leaf shape, and growth form. At least two distinct ecotypes are available from commercial nurseries in the United States,



Chionanthus retusus

one adapted to warm, dry climates like that of southern California and the other better suited to cold, moist climates like that of New England.

Corylopsis spicata (Japanese winterhazel): zone 5. All winterhazels produce beautiful, soft-yellow flowers in early spring and perform best in moist soil under light shade. Japanese winterhazel, together with fragrant winterhazel



Corylopsis spicata

(*C. glabrescens*), is the hardiest species of the genus. It can reach six to ten feet in height with an equal spread and works well as a mass planting. The soft yellow color of its flowers offers an attractive antidote to the bright yellow forsythia that bloom at about the same time.

Fothergilla major 'Mt. Airy': zone 5. The 'Mt. Airy' cultivar is more vigorous and floriferous than the species. It spreads rapidly from underground stems and tolerates a wide range of conditions. It grows to about five or six feet in height and produces fall color in a gorgeous blend of yellow, orange, and scarlet.

Magnolia x 'Wada's Memory': zone 4. This hybrid of the willowleaf (*M. salicifolia*) and kobus (*M. kobus*) magnolias grows to be about thirty feet tall and only ten feet wide, producing

large, pendant, white flowers in early spring. The combination of upright, conical habit and drooping flowers is very striking. Like both its parents, 'Wada's Memory' does best in full sun and moist soil.

Prunus cyclamina (cyclamen cherry): zone 6 (5?). A native of central China, cyclamen cherry grows to thirty feet in height with an equal spread. It produces prolific clusters of small, rose-pink flowers in early spring, and in fall its foliage turns a beautiful orange-red. Compared to other cherries cultivated at the Arnold Arboretum, cyclamen cherry is free of pests and disease.

Rhododendron calendulaceum (flame azalea): zone 5. This azalea is one of the best-adapted to the Northeast. It blooms in late May to early June, producing yellow, orange, or red flowers. It grows equally well in sun and shade and is tolerant of drought and, compared to other azaleas, of soils with high pHs. Inferior hybrids and cultivars have largely displaced the flame azalea in contemporary land-

scapes, but its hardiness and lack of susceptibility to powdery mildew have led to a resurgence of interest, especially for naturalistic plantings.

Syringa x *chinensis* 'Lilac Sunday': zone 3. This cultivar of the persian lilac, selected at the Arnold Arboretum, is a large, spreading shrub that can grow to be ten to fifteen feet tall and equally wide, producing foot-long racemes of light purple flowers in mid-May. In general, persian lilac is more heat tolerant and disease resistant than the common lilac (*Syringa vulgaris*); it also produces a smaller, more delicate foliage, creating a lacy appearance.

Weigela subsessilis (Korean weigela): zone 5. This multistemmed shrub from Korea grows to be about six feet tall and six feet wide. In May it produces three-inch-long flowers that change



Syringa x chinensis 'Lilac Sunday'

gradually from pale yellow to lavender, creating an interesting, multicolored effect. The plant deserves further testing under both nursery and landscape conditions.

Xanthocercus sorbifolium (yellowhorn): zone 4 (3?). An upright shrub or small tree from China, yellowhorn grows to fifteen feet in height with a somewhat gawky growth habit. It produces showy white flowers on six- to ten-inch-long racemes in late spring. Yellowhorn is tolerant of full sun and of dry soils with high pHs; together with its ability to spread from root suckers, this makes it potentially useful for highway embankments and other difficult sites.

SUMMER

Actinidia kolomikta (kolomikta kiwi): zone 4. This unusual vine from northeast Asia normally produces irregularly variegated leaf tips of white and pink in spring and summer, making it look as though someone had splashed paint on its leaves. It should be sited so that its dramatic foliage can be viewed from above (e.g., below a deck). If left to its own devices, the kolomikta kiwi can spread into adjacent trees and damage them, a problem that can be avoided by training it to a trellis or periodically pruning it.

Aesculus parviflora (bottlebrush buckeye): zone 4. This large, July-blooming buckeye is native to the southeastern United States. Its spectacular flower spikes can reach up to twelve inches in length. It is decidedly shrubby in habit, forming large clumps from underground suckers and layers. Unlike most buckeyes, it is totally free of leaf scorch, so its foliage looks good throughout the summer and fall. Because it grows equally well in sun or shade, the bottlebrush buckeye is perfect for sites where the woodland meets the garden's edge—especially since its win-



Aesculus parviflora

*Aesculus parviflora**Hydrangea paniculata* 'Praecox'

ter habit can be gawky when cultivated as a specimen in the open.

Cercidiphyllum japonicum 'Morioka Weeping': zone 4. This spectacular katsura cultivar originated in Morioka City, Iwate Prefecture, Japan, and was introduced into North America by the Arnold Arboretum in 1981 under the name *Cercidiphyllum magnificum* 'Pendulum'. 'Morioka Weeping' can be distinguished from other weeping katsuras by its ability to form a

central leader without staking. It produces strongly pendant branches with a growth form reminiscent of weeping beech, and it should be planted near water for fastest growth and best effect. Twenty-year-old plants of 'Morioka Weeping' are now over thirty feet tall and ten feet wide.

Hydrangea paniculata 'Praecox' (early hydrangea): zone 3. Early hydrangea forms a large shrub growing to about ten feet in height and the same in width. It begins to flower in midsummer, continuing for about six weeks, with sterile flowers that gradually turn from white to red to papery brown. In appearance, it is more "natural" than the old-fashioned peegee hydrangea (*H. paniculata* 'Grandiflora'), but it is every bit as hardy and flexible in its soil and moisture requirements. The cultivar 'Tardiva' is similar to 'Praecox', but blooms about a month later.

Hydrangea quercifolia (oakleaf hydrangea): zone 5. The horticultural merits of this outstanding shrub, a native of the Southeast, have finally been recognized. It grows well in either sun or shade, and is tolerant of dry soils. It produces beautiful blossoms in July and stunning burgundy-red fall color; in fact, even if

the plant never flowered, it would be worth growing for its bold foliage. This species and all of its cultivars well deserve the popularity they are now enjoying.

Liriodendron tulipifera x *chinense* (Chinese-American tulip tree): zone 5(?). One plant of this cross has been growing at the Arboretum since 1981; it is now over thirty feet tall and fifteen feet wide. Its foliage is bronzy colored in spring, and its flowers, though somewhat smaller than



Quercus phellos

those of the American species, have more orange in their petals. This hybrid tulip tree was developed at the University of North Carolina in 1978 and should be tested in landscape situations. The specimen at the Arboretum has been given the cultivar name 'Chapel Hill'.

Quercus phellos (willow oak): zone 5b. Although commonly planted as a street or park tree in the South, willow oak is underutilized in the Northeast. When raised from seed collected in the northern part of its range (e.g., central New Jersey), it is perfectly hardy into southern New England. It grows to about sixty feet and maintains a strong central leader well up into the crown. Its small, narrow leaves cast a light shade that allows grass to prosper underneath it, and, as an added bonus, are easy to clean up in the fall. Willow oak is late to leaf out in the spring, but it makes up for its slow start by growing continuously throughout the heat of summer.

Rhododendron arborescens (sweet azalea): zone 4. Sweet azalea is native to moist habitats throughout the mountains of the Southeast. In late June and July it produces extremely fragrant white flowers that are highlighted by bright red anther filaments. Since its glossy green foliage is generally undamaged by insects or fungi, it remains attractive throughout the growing season. Sweet azalea can grow to about six feet in height and spreads laterally by underground stems, making it an ideal choice for naturalistic landscapes.

Xanthorhiza simplicissima (yellowroot): zone 3. This woody groundcover grows to be about two feet tall, spreading vigorously by underground stems and performing well in both wet and dry soils and in sun or shade. Its adaptability and persistence make yellowroot a good choice for low-maintenance landscapes. It was used more commonly in the past than it currently is.

FALL

Acer pseudosieboldianum (Korean maple): zone 4. This medium-sized understory tree from northeast Asia produces spectacular fall color ranging from orange to scarlet in late October. The species is similar in general appearance to the Japanese maple (*A. palmatum*), but it is more upright in habit—growing to be about thirty feet tall and fifteen feet wide—and more cold hardy. It deserves wider testing under landscape conditions, particularly in zones 4 and 5, where Japanese maple can have problems.

Acer triflorum (twisted-bark maple): zone 5 (4?). This mid-sized tree from northeast China can grow to forty feet in New England. Like its near relative the paperbark maple (*A. griseum*), it produces trifoliate leaves. Its most striking features include late fall color that ranges from bright red to orange, and its whitish-tan, shredding bark in winter. *A. triflorum* performs reliably under a wide range of conditions and appears to be hardier than *A. griseum*.

Enkianthus perulatus (white enkianthus): zone 5. White enkianthus is a slow-growing deciduous shrub from Japan that eventually grows to six feet in height with a similar spread. In spring

it produces small, white flowers, and in fall its fine-textured foliage turns rich burgundy to flaming scarlet, brighter than any other plant cultivated at the Arnold Arboretum, where specimens of *E. perulatus* have been growing in full sun and dry soil for over a hundred years.



Enkianthus perulatus

Euonymus carnosus (glossy euonymus): zone 6 (5?). This small deciduous tree from China can grow to about twenty feet in height. At the Arnold Arboretum, glossy euonymus has been free of pests and disease for nearly twenty years. Its shiny, dark green foliage turns a striking burgundy red in late fall, quite unlike that of any other euonymus cultivated at the Arboretum.

Heptacodium miconioides (seven-son flower): zone 5. This tall deciduous shrub or small tree, introduced from China in 1980, can grow to be about twenty feet tall and fifteen feet wide. *Heptacodium* produces six-inch-long panicles of small, white flowers in late summer, followed rapidly by a beautiful display of showy, rose-magenta seeds in early autumn. It is tolerant of clay soils, road salt, and full sun, making it a good choice for roadside plantings. Its white, exfoliating bark is spectacular in winter, especially when trained to develop a single stem.

Koelreuteria paniculata 'Rose Lantern' ('Rose Lantern' golden raintree): zone 5. This deciduous, round-headed tree grows from thirty- to forty-feet tall with an equal spread. It produces striking yellow flowers in showy panicles in late August or early September, almost a month later than is typical of the species. The fruit capsules are an attractive light pink, eventually turning paper-brown. 'Rose Lantern' grows well in full sun and dry soil, making it suitable for streets and parking lots. This clone has been widely distributed under the cultivar name 'September'.

Lindera obtusiloba (Japanese spicebush): zone 5b. This deciduous, wide-spreading shrub grows to about fifteen feet in height with an equal spread. Its leathery, distinctively lobed leaves are extremely handsome and turn a bright, chrome yellow for a full two weeks in late fall—indeed, in terms of fall

color, Japanese spicebush is one of the Arboretum's most reliable performers. It is a complete mystery why one seldom sees this plant in New England landscapes.

WINTER

Ilex pendunculosa (longstalk holly): zone 5. This Japanese species, which can grow to be fifteen feet tall and ten feet wide, is one of the hardiest of the upright hollies. Its attractive red fruit and delicately creased, glossy foliage make it an excellent choice for northern gardens, either as an informal hedge or as a specimen. Like most hollies, it grows best in light shade and moist, well-drained soil.

Magnolia virginiana var. *australis* (evergreen sweetbay): zone 5b. This slender, upright tree grows to be thirty feet tall and ten to fifteen feet wide, with a strong central trunk. The evergreen sweetbay has narrow leaves and deliciously fragrant, two-inch-wide flowers in June and July. A native of the Southeast, it is botanically and



Magnolia virginiana var. *australis*

horticulturally distinct from the shrubby, deciduous sweetbay that grows in the Northeast (var. *virginiana*), but not quite as hardy.

Stewartia sinensis (Chinese stewartia): zone 6 (5?). This species is an understory tree from China that can grow to thirty or forty feet in height. In summer it produces small, white flowers (one-and-a-half-inch in diameter). With its smooth bark, white to tan in color and resembling alabaster, Chinese stewartia is every bit as beautiful as the more commonly planted Korean stewartia, *S. pseudocamellia*. It needs moist, well-drained soil and performs well in either full sun or light shade.

CONIFERS

Abies koreana (Korean fir): zone 5. This relatively small fir, around twenty to thirty feet tall and ten feet wide at maturity, produces highly ornamental purple-blue cones at a young age. Like most true firs, this Korean species requires

full sun, but unlike other species it flourishes at sea level and is tolerant of a variety of soil conditions. This is one of the few firs suitable for use in small residential landscapes.

Calocedrus decurrens (California incense cedar): zone 5. This tall evergreen from the mountains of California grows to be about fifty feet tall in the East. Incense cedar typically develops a narrow, almost fastigate, growth habit that is very striking in the landscape, with foliage that stays bright green through the winter. It grows best in full sun and is tolerant of a wide range of soil conditions, including clay and extreme drought, and has no serious pest or disease problems in the East. This plant deserves to be much more widely grown than it currently is.



Abies koreana

Cedrus deodara 'Shalimar': zone 6. This hardy form of the deodar cedar was selected at the Arnold Arboretum in 1982, where it grows to about thirty feet in height. Its beautiful, blue-gray foliage and graceful, drooping branches make the deodar cedar a dramatic landscape specimen. It grows best in full sun and is very tolerant of dry soil.

Thuja plicata (western arborvitae): zone 5. Although native to northwestern North America, this species is perfectly hardy in the Northeast. In comparison to *T. occidentalis*, the eastern arborvitae, *T. plicata* is taller and looser in growth habit, forms a strong central leader, and has much better winter color. It can grow to be fifty or sixty feet tall in the East, with a spread of about twenty feet.



Calocedrus decurrens



Cedrus deodara 'Shalimar'

Tsuga chinensis (Chinese hemlock): zone 6 (5?). A tall evergreen, Chinese hemlock grows to at least fifty feet in height in the Boston area. Preliminary evidence indicates that it is resistant to the hemlock woolly adelgid, but more research is needed before the species gets a full recommendation. The oldest specimen in North America, collected in China by E. H. Wilson, has been growing at the Arnold Arboretum since 1910.

Peter Del Tredici is director of living collections at the Arnold Arboretum.

For a list of nurseries that carry these plants, contact the Arboretum's membership department by mail or by e-mail (membership@arnarb.harvard.edu).

Cypress Knees: An Enduring Enigma

Christopher H.
Briand

The cypresses keep
their secrets from the
prying investigator.

—J. E. Rogers, 1905

The function of cypress knees has long intrigued botanists. In 1819, François André Michaux wrote, "No cause can be assigned for their existence," and in 1882 Asa Gray concurred. Nevertheless, throughout the nineteenth century and continuing to the present, botanists have put forth hypotheses about the function of these peculiar formations, hypotheses that have included aeration of the root system, vegetative reproduction, mechanical support, nutrient accumulation, and carbohydrate storage. The aeration theory has been the most popular and, indeed, is presented without question in some botany texts, but in fact, no explanation has been generally accepted.¹

The genus *Taxodium* has been present in North America since at least the Upper Cretaceous, approximately seventy million years ago, but very little is known about when knees first developed and why. Knees can be found on both varieties now extant in the United States. Baldcypress (*Taxodium distichum* var. *distichum*) is distributed along the coastal plain from southern Delaware to southern Florida, west to southeastern Texas, and inland along the Mississippi Valley as far north as southern Illinois and Indiana. Pondcypress (*Taxodium distichum* var. *imbricarium*) has a more limited distribution, with its northern limit in south-



Baldcypresses in the Wolf River, near Memphis, Tennessee.

PETER DEL TREDICI

eastern Virginia and its range extending south throughout Florida and west to southeast Louisiana. The two varieties are readily distinguished by their leaf morphology and the orientation of both their leaves and branchlets. While the leaves of baldcypress are needle-like and generally arranged in two rows, those of pondcypress are scalelike and radially distributed around the branchlets. Also, baldcypress branchlets are horizontally oriented, whereas pondcypress branchlets are often ascending. Where they overlap in distribution, however, there is considerable morphological intergradation.²

Visitors to the cypress swamps of the southeastern United States are often intrigued by the swollen bases, or buttresses, of cypresses, and by the woody conical structures—the knees—of varying size found around the base of many trees. More than anything else, the knees resemble termite mounds, but are in fact outgrowths of the shallow, horizontal roots of the cypress trees and are not caused by insect activity. Knees are formed on the upper surface of these roots by the vascular cambium, the



The denuded roots of a baldcypress, showing the knees and underground structure.

meristematic layer that produces xylem and phloem, the tissues that transport water and nutrients through the plant. The knees are generally solid, but may become hollow over time due to rotting. In cypress plantations, knees are found on trees as young as twelve years old.³

Cypress knees vary greatly in size. In 1803, Andrew Ellicot observed knees as high as eight to ten feet; the tallest on record is a knee fourteen feet in height seen on a tree growing along the Suwannee River, which flows through Georgia and Florida.⁴ Many researchers have agreed that it is average water depth that determines the height of knees, and one observer, Mattoon, reported that the knees on trees growing in softer soils were larger than those produced by trees growing on firmer land.⁵

In spite of much research and a plethora of hypotheses, exactly what stimulates cypresses to form knees remains, like the knees' function, unknown. In the following, I will review all these hypotheses and the present state of our knowledge about cypress knees.

The Aeration Hypothesis

Knees are most often found on the roots of trees growing in wet soil and in relatively shallow water; they are generally absent from trees growing in deeper water and only occasionally on trees growing on land that is dry year-round. In 1934, Herman Kurz and Delzie Demaree, working in Florida, suggested that knees may be caused by the root system being alternately exposed to water and air. In 1956, L. A. Whitford, a researcher working in North Carolina, came to a similar conclusion: "The formation of cypress knees seems . . . to be a response of the cambium of a root growing in poorly aerated soil or water to chance exposure to the air during the spring or early summer." Another indication that aeration may play a role in knee development emerged from research done in 1991 by Fukuji Yamamoto, who observed that the number of knees per tree declined with increasing water depth. The fact that knees have been reported on trees found on land that is dry year-round, of course, throws into question the

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Sun-Loving Shrubs and Vines: A Garden of Their Own

Robert E. Cook, Director

Two thousand and one will be a year of landscape construction at the Arboretum. Five years ago we added a 15-acre wetland to our lease with the City of Boston. This spring we will initiate construction of a stonedust pedestrian pathway that will open the site to the public by connecting the Forest Hills train station with a major gateway into the grounds at South Street. New steel gates, stone pillars, and walls will be added at each end of the path. A second project will install similar steel

gates at Bussey Street where it separates the Peters Hill area from the rest of the Arboretum. New land for the planting of trees will be created by removing a short stretch of existing asphalt roadway along the south edge of Bussey Brook. We will say more about these projects in a later issue.

Our largest landscape project, set to begin construction in May, will create the Sun-Loving Shrub and Vine Garden on three acres of land located northeast of our greenhouse and bonsai complex.

Designed by the landscape architecture firm of Reed Hilderbrand, this new garden will allow us to greatly expand our current collection and to display up to 400 shrub species and cultivars not grown elsewhere on the grounds. In addition, an open-air pavilion with attached trellises, and an extensive system of steel vine structures will permit us to grow approximately 100 vine species as individual specimens integrated into a single horticultural space.

• *continued on page 2*

A Schoolyard Arboretum

Last November teachers and students at the Nathan Hale Elementary School in Roxbury held a ceremony to dedicate their newly constructed schoolyard, which has been specially designed to include an arboretum. Twelve remarkable trees will become part of the educational experiences for both teachers and students, as they document each tree's growth and characteristics over the years.

This schoolyard renovation is part of the Boston Schoolyard Initiative (BSI), which awards grants to schools with a vision as well as a constituency capable of making significant improvements to the schoolyard environment. For the



Kirstin Behn

past four years, the BSI has funded the renovation of 48 public schoolyards. Two years ago, the BSI approached staff at the Arbo-

retum to discuss how to ensure that the newly designed playgrounds were places for outside

• *continued on page 4*

The garden will provide a new, unique destination for visitors, offering a diverse collection of woody shrub and vine taxa in an elegant botanic garden setting. As a collection, it will also create an array of educational opportunities: students of horticulture and landscape design as well as the general public will learn the practical uses of shrubs and vines.

In keeping with the agricultural nature of our nursery and propagation greenhouses nearby, the garden will consist of a series of terraces laid out on a gently sloping site and created by exten-

sive fieldstone retaining walls; each terrace will have a series of planting beds separated by grass pathways. The site is framed at the top by a long, high, stone retaining wall below the bonsai house that runs for more than five hundred feet in length and reaches almost eight feet at its maximum height. Stonedust paths lead visitors along this great wall among vine structures to a vine-covered pavilion overlooking the garden and down bluestone steps onto the great lawn that sweeps downhill through the center of the terrace system. Despite a thirty-foot difference in grade between the

top and bottom of the garden, it will be fully accessible to wheelchairs and mobility-impaired visitors.

Construction of the Shrub and Vine Garden will require closing the greenhouse and bonsai area for a period of six months. While construction should be complete by Thanksgiving, the planting of shrubs and vines will be delayed until the spring of 2002. We believe that this new collection, displayed in a beautiful garden setting, will make a unique contribution to the horticultural resources of the Arboretum and the City of Boston.

2001 PIPD Releases

In its continuing efforts to share exceptional woody plants from the living collections with progressive nursery professionals, the Arboretum is releasing two outstanding plants in its Plant Introduction, Promotion, and Distribution Program for 2001.

Fothergilla gardenii 'Harold Epstein' was first collected in Jesup County, Georgia, by the late Harold Epstein of Larchmont, New York, plantsman extraordinaire. Originally classified as a separate species—*F. parvifolia*—later investigations have placed it within *F. gardenii*. It is a diminutive shrub with a low, dense, mounding form that slowly reaches a height of 10 to 12 inches and a width of 16 to 18 inches in about five years. The white, bottlebrush-like flowers are fragrant and appear in late April to early May. The dark-green foliage of summer turns yellow to vibrant orange-red in autumn. Though its overall appearance is delicate, the Harold Epstein fothergilla thrives in full sun and is insect- and disease-resistant. Its ability to sucker and spread allows it to form a good groundcover mat.

Liquidambar acalycina, a Chinese sweetgum, was introduced into the U.S. in 1980 by the Sino-American Botanical Expedition, in which the Arboretum was a participant. Its three-lobed leaves give this species an appearance very different from our native, five-lobed *Liquidambar styraciflua*. Spring foliage is burgundy-



Liquidambar acalycina

red, maturing to dark green in summer, and finally becoming yellow in autumn. Specimens that have been growing at the Arboretum for 20 years are narrow and upright in habit with smooth, silver bark. The tree appears to be as easy to grow as other members of its genus are, and it exhibits no serious pest or disease problems.

Nurserymen interested in participating in the PIPD program should contact Tom Ward by fax at 617/524-6413.

Tom Ward

Terry Sharik, Arnold Arboretum Associate, talks about his textbook project

Dendrology, or "the study of trees," is taught in virtually every university that offers an undergraduate degree in forestry. In the U.S. alone, this amounts to more than sixty schools. The advanced courses students take may vary, but all of them take dendrology near the beginning of their studies. Indeed, the degree of enthusiasm generated in the dendrology course may spell the difference between a student staying in forestry and choosing another field.

Typically, the textbooks used in dendrology courses cover the economically important tree species native to that country or at best to that continent (very few species occur on more than one continent). For example, of the nearly 1,000 tree species native to the conterminous United States, the beginning student enrolled in a dendrology course may be expected to know 100 species in 30 genera in some detail. Currently available textbooks offer instruction on these key species that includes morphological characteristics important in identification, together with information on geographic distribution, size of mature individuals, economic uses, and various aspects of the ecology of the species. The challenge for the instructor is to make this catalogued information come alive, and this is no easy task.

I am writing a dendrology textbook for undergraduates that reaches far beyond current textbooks in its geographic scope and in its attention to the aspects of form and function that adapt trees to grow in particular environments. The text will focus on ecologically and culturally important genera of trees in the temperate regions of the world. Focusing on genera instead of species (most genera extend over more than one continent) will expose students to the major patterns in the evolution of tree habit and enable them to appreciate the variations on a theme that exist in the species constituting a particular genus. This global genus approach will allow instructors to supplement the text with study of local and regional woody plant floras and observations of trees in their natural habitats, thus helping the material come alive.

Focusing on the relationships between form and function will also help students to understand why, for example, species of some genera survive where heavy snowfall and cold climates are the norm, while others thrive in regions where water is scarce most of the year. This, in turn, can lead to an appreciation of the changes in species distribution that may occur as



Kirstin Behm

a result of impending global climate change. The approach also has the virtue of shifting the emphasis from a static to a process orientation.

In September 2000, I relocated at the Arnold Arboretum as part of a one-year sabbatical leave from Utah State University. With over 2,000 species and nearly 5,000 taxa, the living collections of temperate-region woody plants from all major continents are clearly among the best in the country. The plant collections together with the herbarium specimens and literature on woody plants worldwide, both in Jamaica Plain and Cambridge, make this an ideal location for my preparation. Later on, I anticipate traveling to other continents to observe and photograph species of the genera to be covered in the textbook in their natural habitats.

We are clearly at a point in history where how we manipulate our local forest ecosystems has global implications, a fact that needs to be more deeply appreciated by undergraduates who will manage those ecosystems and their resources. I hope this project will inspire a more global approach to dendrology that instructors will in turn instill in their students.

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learning as well as recreation. This request was sparked by the Arboretum's program Seasonal Investigations, a yearlong course of study funded by the National Science Foundation, which supports teachers who wish to incorporate outdoor tree studies in their science curricula.

In 1999, with partial funding from the BSI through a grant from the Greater Boston Urban Resources Partnership, the Arboretum began a pilot project with the Nathan Hale School to identify and develop program elements for a schoolyard arboretum that could be used by other BSI-funded schools. From October 1999 through February 2001, Arboretum staff worked with the teachers and principal to incorporate an arboretum into the schoolyard plans and to create a professional development program that supports outdoor studies using the trees.

The project included a series of monthly teacher workshops and meetings devoted to increasing teachers' knowledge of trees and to considering how teachers might incorporate tree study into science lessons. One outcome was a list of trees that offer a variety of bark textures, flower forms and times, leaves, and overall shapes.

The project culminated in a schoolwide election of a favorite tree. Each candidate was introduced through photographs and descriptions. The students then researched the trees on a special website, and finally everyone voted. When the overwhelming favorite—*Acer saccharum* (sugar maple)—was announced at the next week's assembly, students broke into enthusiastic applause.

This project has allowed us to identify issues related to integrating a schoolyard arboretum into the educational experiences of teachers and their students. These issues include the time required

for both teachers and students to adequately explore questions and ideas; professional development efforts that address the use of the outdoors as well as science content; the kinds of support, both human and technical, that can aid in such an endeavor; and the importance of school leadership in reaching a successful conclusion.

There is much to celebrate about this pilot study. Participating teachers learned how to incorporate outdoor studies into their science curriculum. The entire school community is aware of the arboretum in the schoolyard and has established a sense of stewardship around the continued growth of these trees. We have learned a great deal about what makes such a project work well and are seeking funding to continue this work. To learn more about this program, visit the special schoolyard arboretum website www.arboretum.harvard.edu/~schoolyard/nsf.

Upcoming Events

Lilac Sunday

The Arboretum's annual celebration of lilacs will occur on Sunday, May 13—Mothers' Day. The only day when picnicking is allowed on the grounds, Lilac Sunday is a time-honored tradition for visitors who enjoy the sights and scents of our extensive lilac collection. The day includes food, dance performances, a limited number of lilac plants for sale, lots of lilac information, and, of course, the lilacs! Admission is free, and the event occurs from 10:00 am to 4:00 pm.

Fall Plant Sale

Mark your calendars for Sunday, September 16, when the 21st Annual Fall Plant Sale will be held at the Case Estates in Weston. For updates as they become available, you can check our website—www.arboretum.harvard.edu. We anticipate quality and quantity in all areas: plant selection, attendance, and weather.



Karen Madsen

need for periodic flooding or drying to stimulate knee formation.⁶

The need for aeration has been a favorite hypothesis for explaining the function, as well as the formation, of knees. Since all plant roots need a source of air to carry out cellular respiration, some researchers have suggested that knees are simply a form of pneumatophore, or breathing root. Pneumatophores are specialized roots that characterize many woody plants growing in poorly aerated soils, such as in swamps or in the intertidal zone; examples include *Avicennia nitida* (black mangrove), *Sonneratia alba* (mangrove apple), and *Bruguiera parviflora* (small-leafed orange mangrove). Pneumatophores grow either entirely above the level of the water, or in such a way as to be exposed only during low tide. They are characterized by the presence of lenticels (porous regions in the bark that allow gas exchange with the atmosphere) and of aerenchyma, the specialized internal tissues that transport gases through many hydrophytic plants.⁷

The first published suggestion that cypress knees may be a form of pneumatophores dates from 1848, when Montroville W. Dickenson and Andrew Brown wrote in the *American Journal of Science and Arts* that by means of knees "the roots although totally submerged, have a connection with the atmosphere." They also suggested that when the knees were inundated, the connection with the atmosphere could be maintained by the swollen base of the tree, sometimes called the "bottle buttress": "Such enlargements never fail to rise to the top of the highest water level . . ." In 1887 Nathaniel Shaler conjectured that "[the] function of the knees is in some way connected with the process of aeration of the sap . . ." with air entering the knees through newly formed bark at their apex. He also observed that trees died when the water rose high enough to inundate the knees. Two years later, in 1889, another researcher was even more categorical: "[the] location and occurrence [of knees] indicate beyond a doubt that they are for purposes of aerating the plant." In their 1934 paper, however, Kurz and Demaree stated just as categorically that it is "difficult to rec-



CHRIS BRIAND

Single young baldcypress with buttressed base growing in Chipman Pond, Delaware.

oncile the aeration hypothesis with the fact that cypresses of the deeper waters are devoid of knees."⁸

As early as 1890, Robert H. Lamborn, writing in *Garden and Forest*, had suggested that tests be conducted to learn whether or not knees were indeed "aerating" the trees' roots. Nevertheless, in spite of all the theorizing, little was done to test the pneumatophore hypothesis until 1952, when Paul J. Kramer and his colleagues at Duke University used modern physiological techniques to ascertain the amount of oxygen consumed by knees on living cypresses. They enclosed the knees in airtight containers sealed with a mixture of paraffin and beeswax, and used an oxygen analyzer to measure the amount of oxygen consumed over several weeks. The rate of oxygen consumption was actually lower than for other plants, leading the researchers to conclude that "the available evidence indicates that cypress knees play no important role as aerating organs."⁹



Baldcypress knees appear to march from dry land into the Wolf River, Tennessee.

Anatomical evidence presents another problem for the hypothesis that knees are a form of pneumatophore. Two studies found that knees lacked aerenchyma—the spongy tissues in true pneumatophores that transport air from the knee to the rest of the root system. In addition, lenticels—the regions of the bark that in pneumatophores allow air to be taken up from the atmosphere—are also absent from cypress knees.¹⁰

The Methane Emission Hypothesis

A less frequently heard theory is one presented by William M. Pulliam in 1992: "Given the possibility that cypress knees provide a conduit to

the below-ground environment, it was hypothesized in the present study that knees may also show methane emissions." Methane is not toxic to plants, but neither is it of use to them.

Pulliam measured total methane emissions from trees in swamps bordering the Ogeechee River in Georgia, finding rates that averaged 0.9 milligrams per day." His tests showed that cypress knees accounted for a negligible amount of the methane emissions from the swamp—less than one percent. This methane is commonly referred to as "swamp gas." Furthermore, it is quite possible that even this miniscule amount of methane was being produced by the bacteria that are found on the outside of the knees, rather than being vented from the soil through the knees.¹¹

The Vegetative Reproduction Hypothesis

Lamborn, in his 1890 review of what was known about cypress knees at that time, mentioned and then quickly discarded the idea that cypress knees were organs of vegetative reproduction: "I have . . . examined hundreds of living 'knees' in southern swamps, and found upon them no trace of bud, leaf or sprout . . ." No one has since revisited this hypothesis.

The Mechanical Support Hypothesis

Buttresses and stilt roots provide mechanical support for a number of tropical trees. It was again Lamborn, in 1890, who first proposed that knees perform the same function for cypress trees growing in wet soil: "I became convinced that the most important function of the Cypress knee is to stiffen and strengthen the root, in order that a great tree may anchor itself safely in a yielding material." Increased support, he believed, allowed cypresses to withstand strong winds such as those produced by hurricanes. Lamborn suggested that knees located on horizontal roots add stiffness and strength to the junction between the horizontal root to which

the knees are attached and the vertical roots that branch off directly below the knees. In 1915, Wilbur R. Mattoon, working for the United States Forest Service, concurred with Lamborn, opining that knees were involved in "enlarging and strengthening the basal support" provided by the rest of the root system. He pointed out that deep roots growing down from the base of the knees provided considerable anchorage for the tree. Both Mattoon and Lamborn premised their hypotheses on the assumption that vertically oriented roots and knees always occur at the same location on horizontal roots, as was apparently the case in

their observations. However, Clair A. Brown and Glen N. Montz found that cypresses sometimes produce knees at locations other than above downward-growing roots, and, conversely, that some downward-growing roots do not share a junction with knees on the horizontal roots. And, as with the pneumatophore theory, the absence of knees on the roots of trees growing in deeper water casts doubt on this hypothesis, since there is no reason to believe that they too wouldn't need support. The hypothesis could be tested empirically in the same way that researchers have used cables and winches to pull down trees in order to

Looping Roots vs. Knees

Cypress, as well as water tupelo (*Nyssa aquatica*), red maple (*Acer rubrum*), and a number of other swamp and mangrove species, also produce looping roots that somewhat resemble knees. In baldcypress, normal knees are often found at their apex. These looping roots are essentially roots that grow up out of and then back into the soil, producing an aboveground loop or fold. In water tupelo, looping roots can reach a height of 22 inches and a width of 26 inches. The function of these structures, beyond that of normal roots, is obscure. Penfound observed that aeren-

chyma was lacking in the looping roots of water tupelo and questioned the efficacy of these structures as pneumatophores. Knees have even been reported on pond pine (*Pinus serotina*) growing under wet conditions in Georgia. It is unclear if these resemble normal knees or looping roots.¹⁶



A looping root of red maple (*Acer rubrum*) growing in a swamp at Adkins' Mill Pond, Maryland.



Knees are beginning to form at the apex of the looping roots of a cultivated baldcypress.

compare the stability of buttressed versus non-buttressed tropical trees—such a test could compare trees with knees to trees that have had their knees removed—but no one has yet done so.¹²

The Nutrient Acquisition Hypothesis

Lamborn postulated that another secondary function of cypress knees, along with that of giving mechanical support, was to act as “drift catchers” that accumulate organic nutrients during periods of water movement. A hundred years later, Hans Kummer and his colleagues at

roots were not generally in direct contact with decaying stumps. Direct evidence of nutrient acquisition was not obtained, however. Kummer and his colleagues suggested that further work was needed to determine if “young root loops extract nutrients from stumps . . . [or] . . . use stumps merely as vertical supports to reach air above the water table.”¹³

The Carbohydrate Storage Hypothesis

Clair A. Brown in 1984 and again with Montz in 1986 postulated that the primary function of cypress knees is as a storage organ. They reported the presence of “granules”—presumably amyloplasts (organelles that store starch)—and confirmed the presence of starch by performing iodine tests on the cut surface of sectioned knees. Even if their hypothesis is accurate, unanswered questions remain about the function of knees. Why do cypresses need an auxiliary storage organ when growing under wet conditions, but not dry? Is it possible that cypress roots in general store starch, and that knees are simply extensions of

these storage areas? Unfortunately, no comparison of the storage capacity of roots and knees has been made to test the hypothesis.¹⁴

After nearly two hundred years of speculation and research, the function or functions of the knees of cypresses remain unclear. Darwin referred to the origin of the flowering plants as an “abominable mystery”; it appears that the function of cypress knees is another.¹⁵ The truth may be that cypress knees evolved in response to past environmental pressures that no longer exist, in which case their function may be lost in the depths of time. Before we accept this conclusion, however, much further research is needed on this fascinating subject.



Baldcypress trees with buttresses at Trussum Pond, Delaware.

Zurich made a similar supposition about looping cypress roots, which they also called knees, after studying baldcypress in a Florida cypress dome. (A cypress dome is a group of cypresses growing in a shallow depression where the largest trees are located in the center and tree height declines toward the periphery.) They found that the number of looping cypress roots present were highly correlated with the number of dead cypress trees in the dome, but not with the number of live trees. In other words, looping root density increased with an increase in the number of dead cypress stumps. They also observed that approximately 98 percent of the youngest looping roots spread over the stumps and penetrated the dead wood. Older looping

Endnotes

- ¹ Julia E. Rogers, *The Tree Book* (New York, 1905); F. A. Michaux, *The North American Sylva* (Paris, 1819); R. H. Lamborn, The knees of the bald cypress, a new theory of their function, *Garden and Forest* 3 (1890): 21–22; excerpted in *Arnoldia* 60(2): 14–16; J. D. Mauseth, *Botany*, 2nd ed. (Philadelphia, 1995).
- ² K. R. Aulenback and B. A. LePage, *Taxodium wallisii* sp. nov.: First occurrence of *Taxodium* from the Upper Cretaceous, *International Journal of Plant Science* 159 (1998): 367–390; L. P. Wilhite and J. R. Toliver, *Taxodium distichum* (L.) Rich. Baldcypress, *Silvics of North America*, ed. R. M. Burns and B. H. Honkala (Forest Service, USDA, Washington, D.C.), 563–572; H. S. Neufeld, Effects of light on growth, morphology, and photosynthesis in Baldcypress (*Taxodium distichum* [L.] Rich.) and Pondcypress (*T. ascendens* Brongn.) seedlings, *Bulletin of the Torrey Botanical Club* 110 (1983): 43–54; *Ibid.*, Wilhite and Toliver.
- ³ W. T. Penfound, Comparative structure of the wood in the “knees,” swollen bases, and normal trunks of the tupelo gum (*Nyssa aquatica* L.), *American Journal of Botany* 21 (1934): 623–631; C. A. Brown and G. N. Montz, *Baldcypress: the tree unique, the wood eternal* (Baton Rouge, LA, 1986); D. DenUyl, Some observations on bald cypress in Indiana, *Ecology* 42 (1961): 841–843.
- ⁴ P. J. Kramer, W. S. Riley, and T. T. Bannister, Gas exchange of cypress knees, *Ecology* 33 (1952): 117–121; A. Ellicott, *Journal of Andrew Ellicott* (Philadelphia, 1803; reprinted Chicago, 1962).
- ⁵ N. S. Shaler, Notes on the bald cypress, *Memoirs of the Museum of Comparative Zoology* (Harvard College, Cambridge) 16 (1887): 3–15; W. P. Wilson, The production of aerating organs on roots of swamp and other plants, *Proceedings of the Academy of Natural Science of Philadelphia* 41(1889): 67–69; W. R. Mattoon, *The southern cypress* (USDA Bulletin 272, 1915); H. Kurz and D. Demaree, Cypress buttresses and knees in relation to water and air, *Ecology* 15 (1934): 36–41; G. F. Beaven and H. J. Oosting, Pocomoke Swamp: a study of a cypress swamp on the Eastern Shore of Maryland, *Bulletin of the Torrey Botanical Club* 66 (1939): 367–389; *Ibid.*, Brown and Montz; J. L. Kernell and G. F. Levy, The relationship of bald cypress (*Taxodium distichum* [L.] Richard) knee height to water depth, *Castanea* 55 (1990): 217–222.
- ⁶ *Ibid.*, Wilson; Kurz and Demaree; DenUyl; Brown and Montz; L. A. Whitford, A theory on the formation of cypress knees, *Journal of the Elisha Mitchell Science Society* 71 (1956): 80–83; F. Yamamoto, Effects of depth of flooding on growth and anatomy of stems and knee roots of *Taxodium distichum*, *IAWA Bulletin* 13 (1992): 93–104.
- ⁷ A. D. Bell, *Plant Form* (Oxford, 1991).
- ⁸ M. W. Dickeson and A. Brown, On the cypress timber of Mississippi and Louisiana, *American Journal of Science and Arts* 5 (1848): 15–22; *Ibid.*, Shaler; Wilson; Kurz and Demaree.
- ⁹ *Ibid.*, Lamborn; P. J. Kramer, W. S. Riley, and T. T. Bannister.
- ¹⁰ *Ibid.*, Penfound; Brown and Montz.
- ¹¹ W. M. Pulliam, Methane emissions from cypress knees in southeastern floodplain swamp, *Oecologia* 91 (1992): 126–128.
- ¹² C. Edelin and C. Atger, Stem and root tree architecture: Questions for plant biomechanics, *Biomimetics* 2 (1994): 253–266; *Ibid.*, Lamborn; Mattoon; Brown and Montz; M. J. Crook, A. R. Ennos, and J. R. Banks, The function of buttress roots: a comparative study of the anchorage systems of buttressed (*Aglaia* and *Nephelium ramboutan* species) and nonbuttressed (*Mallotus wrayi*) tropical trees, *Journal of Experimental Botany* 48 (1997): 1703–1716.
- ¹³ *Ibid.*, Lamborn; H. Kummer, et al., Nutritional exploitation of dead trunks: another function of cypress knees (*Taxodium distichum*)? *Trees* 5 (1991): 122–123; H. Kurz, Cypress domes, *Annual Report of Florida State Geological Survey* (1933).
- ¹⁴ C. A. Brown, Morphology and biology of cypress trees, *Cypress Swamps*, ed. K. C. Ewel and H. T. Odum (Gainesville, FL, 1984), 16–24; *Ibid.*, Brown and Montz.
- ¹⁵ D. H. Scott, *The Evolution of Plants* (New York, NY, 1905).
- ¹⁶ *Ibid.*, Wilson; Bell; Brown & Montz; Penfound; P. B. Tomlinson, *The Botany of Mangroves* (Cambridge, UK, 1986).

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Ginkgo biloba in Japan

Mariko Handa

Various theories estimate when ginkgo arrived in Japan. Some say it grew here during the Mesozoic era but then died out. Others argue that it arrived from China along with Buddhism in the sixth century. Nothing has been proven, but whenever and however it arrived, ginkgo is deeply rooted in the lives of the Japanese people, admired for its beautiful shape and its seasonal colors. Today ginkgos grow throughout Japan, along roadsides and streets, in parks and schoolyards, on shrine grounds, and in private gardens. Ginkgo serves frequently as the symbol of a region or as an object of worship, and it plays a role in many legends.

Ginkgo as a Roadside and Street Tree in Japan

According to one account, roadside trees in Japan date back to the middle of the eighth century, when fruit trees were planted along roads for the benefit of travelers. It was in the latter half of the nineteenth century, however—when Japan opened its borders and began to modernize—that trees became a part of urban landscapes.

The forerunners of modern street trees were first seen in Yokohama and in the capital, Tokyo. Willow and pine trees were planted along a street called Bashamichi in Yokohama in 1867. In 1873, black pine (*Pinus thunbergii*), cherry (*Prunus*), maple (*Acer*), and other species were planted in Tokyo along Ginza Street, newly modernized by the construction of European-style brick buildings. The first major use of imported trees to line city streets occurred in 1875 when a North American native, *Robinia pseudoacacia* (black locust), was planted in Tokyo, having been grown from seeds brought back to Japan from the 1873 International Exposition in Vienna. *Ailanthus altissima* (tree-of-heaven), *Firmiana simplex* (Chinese bottle tree), and other species were also planted

at that time, but because of inappropriate planting methods or insufficient care, most of these trees died.

In 1907 a replanting project was initiated along Tokyo's streets using ten species selected for fast growth and the ability to withstand urban conditions: among them, *Platanus* (plane tree), *Liriodendron tulipifera* (tulip tree), Chinese bottle tree, *Castanea* (chestnut), *Acer buergerianum* (trident maple), *Styphnolobium japonicum* (pagoda or scholar tree), *Cornus* (dogwood), *Fraxinus* (ash), and *Mallotus japonicus*. Ginkgos were chosen for the front of Tokyo's City Hall, marking the species' debut as a street tree in Japan.

Tokyo's urban tree-planting projects suffered two major setbacks during the first half of the twentieth century. In 1923, the fires following the Great Kanto Earthquake destroyed more than half the street trees, leaving only about 10,000 still standing. As part of the effort to restore the city, more than 16,000 new trees were planted by the national government and nearly 5,000 by the city of Tokyo itself. This time the principal species chosen were ginkgo, plane tree, and black locust, all of them fast maturing.

The second disaster was the bombing of Japan during World War II, which destroyed 121,162 street and roadside trees in Tokyo, or about 45 percent of the 271,168 that were standing before the war. Postwar, the government's War Recov-





Ginkgos along Midosuji Avenue in Osaka City.

ery Agency appointed a committee to design a tree restoration project. The committee suggested that local trees be used for replanting, in order to take advantage of each region's environmental conditions.

Government records trace the changes in tree species planted in the aftermath of these disasters and during the ensuing period of normality. Between 1922 and 1967, the species planted most often along roadsides and streets throughout Japan was the plane tree, with ginkgo in sec-

ond place. The plane tree was preferred because it best suited the need for fast restoration: first from the 1923 earthquake, and later, from the devastation caused by the war. However, the characteristics that made it useful during the recovery periods—fast growth, vigorous sprouting capacity, and relatively big leaves—made it difficult to maintain as the city matured, and since 1982 ginkgo has been the preferred species for street and roadside planting. Ginkgo grows well in urban environments, withstanding pol-



Ginkgos line a walk at the Tsukuba Research Center of the National Institute of Advanced Industrial Science and Technology in Tokyo.

lution, cold, and even fire. Unlike the plane tree, its shape remains symmetrical, and its changing appearance more clearly marks the progress of the seasons. Similar factors explain the popularity of Japanese zelkova (*Z. serrata*) and trident maple. Evergreen camphor (*Cinnamomum camphora*) is increasingly used for its year-round foliage. And cherry trees remain Japan's overwhelming favorite among flowering trees, despite their susceptibility to disease. The mix of trees has varied by region, however. Ginkgo has been designated the prefectural tree in Tokyo, Kanagawa, and Osaka Prefectures, indicating that it is used preferentially there.

By 1991 a total of almost five million street and roadside trees were recorded in Japan—four

trees for every kilometer of "ordinary" roads, which can be defined broadly as all roads and streets except expressways. A greater diversity of species were planted after the war: whereas in 1938 the top ten species in areas surveyed had accounted for 95 percent of all trees, by 1991, the top ten had fallen to 52 percent of the total, although in aggregate, the five million trees represented five hundred different species. Ginkgo, with 11.5 percent of the total, was followed in popularity by cherry (various species), Japanese zelkova, trident maple, and plane tree.

The use of trees is very different along roads managed by public corporations (primarily expressways). These trees accounted for an additional 1.7 million trees in 1991, representing about 210 species, with Japanese red pine (*Pinus densiflora*), black pine, and cedar (*Cryptomeria japonica*) being the most commonly used, and ginkgo accounting for only one-tenth of one percent. On these wide, high-speed expressways,



Lines of ginkgos are faced with evergreen camphor trees on Otemae Avenue, Himeji City.

large numbers of evergreens are planted to reduce traffic noise in the surrounding residential areas. Where expressways pass through undeveloped areas, such as mountain foothills, species are selected for harmony with the surrounding natural vegetation. Both these factors mean that ginkgo trees are limited to service areas along expressways.

Ginkgo in Geometrical Japanese Landscapes

Ginkgo trees in Japan have often been used in designs that incorporate Western landscaping features, among them allées. An allée of ginkgos shapes the approach to the Meiji Jingu Gaien (Meiji Memorial Gallery) in Tokyo, built in 1926; two lines of ginkgo stand on either side of the path that leads from Aoyama Street to the Gallery. To exaggerate the perspective, the trees are maintained such that their heights decrease as they approach the Gallery—an effect that is further magnified by the slight downward slope of the ground. The massive ginkgos guide the viewer's line of sight to directly focus on the Gallery. The entire complex includes 146 ginkgos, arranged in the four lines leading to the Gallery and in two additional, shorter allées that branch off to the left. The largest of the trees is now about 79 feet tall, with a trunk diameter of about nine feet; the shortest is 56 feet tall with a diameter of about six feet. The trees are pruned every four years to maintain their beautiful shape.

Ginkgos also form the allée in Tokyo's National Showa Memorial Park, a 450-acre park that was created in 1983 to commemorate the



Above, double rows of ginkgos draw the eye to the Meiji Memorial Gallery, Tokyo, photographed in 1988. Below, the sculpted allée in winter 1999.

fiftieth anniversary of the accession of the Emperor Showa. Because the site had previously been occupied by the United States' Tachikawa military base, its condition first had to be improved. The 600 buildings on the base were removed, ponds were excavated, hills were reconstructed, and trees were planted and grasses sown to create forests and fields.



Geometrically pruned ginkgos in the National Showa Memorial Park, Tokyo.

From the park's Tachikawa Gate, a canal extends 255 yards to fountains at the opposite end and, on each side, four lines of ginkgo trees. The 108 ginkgos were moved to their present location from other places on the site in 1982. They are kept at 23 feet to conform with height restrictions imposed by the proximity of the Self-Defense Force Air Base.

The ginkgo allées at both these sites—the Meiji Memorial Gallery and the National Showa Memorial Park—illustrate how Western influences have been adapted to the Japanese sensibility. By using ginkgos—a species that has rarely been used in Western geometric landscapes—the landscape architect, Yoshinobu Orishimo, rendered it unique. The allée is a form that originated in Europe, but in using ginkgos, the effect is very different. This way of combining a form, or vessel, from the West with materials, or contents, of the East is an excellent example of the way culture changes and is transmitted in Japan.

Individual Ginkgo Trees of Note

Many individual ginkgos have taken on special importance in Japan, either for historical reasons or for their place in legend or simply for their size. A giant tree is defined by Japan's Environment Agency as "a tree with a trunk diameter of 300 centimeters [117 inches, or close to 10 feet] or more at a height of approxi-

mately 130 centimeters [51 inches] above the ground." According to a survey in 1988, of the 55,798 giant trees of all kinds in Japan, 4,318 (7.7 percent) were ginkgos, taking fourth place after cedar, Japanese zelkova, and camphor.

When ginkgos grow to immense size, some of them develop distinctive shapes that are reflected in the names given to them. In the *senbon* (one-thousand) ginkgo, the central trunk is surrounded by many secondary trunks, forming a single large tree that looks like a collection of many separate



Hashigami-cho, a giant ginkgo in Aomori Prefecture, northern Honshu.



Shibata-cho, a giant in Miyagi Prefecture, northern Honshu. *Camellia japonica* is flowering at its base.

trees—therefore the name "one-thousand ginkgos." *Sakasa* (upside-down) ginkgos are so-called because their branches, especially the lower ones, appear to be upside down. The names *meoto* (husband-wife) ginkgo and *oyako* (parent-child) ginkgo refer to pairs of trees growing close together and appearing to be related. *Ohatsuki* ginkgo is a name used when flowers bloom at the margins of leaves; *ohatsuki* means "stuck to leaves." In the *chichi* (breast) ginkgo, a number of aerial roots droop down from the thick branches and trunk of the trees, becoming narrower as they near the ground. Many women pray to these sacred trees for the ability to nurse their babies.

Many trees, whether giant or not, are associated with legend and worship. A good example

is the Nigatake ginkgo at Ichou Machi, Sendai City, Miyagi Prefecture. It is a female tree about 115 feet in height with a trunk diameter of about 8.2 feet at chest height; it is said to be a thousand years old. Of its many "breast columns," the largest is 63 inches in diameter. According to legend, the dying wish of Byakkouni, a wet nurse of the Emperor Shoumu (reign 724–749), was that a ginkgo be planted on her grave mound. A god is said to be enshrined at the foot of the tree. Women who cannot produce their own milk often worship there.

Another famous old ginkgo tree, called *mizufuki* (water-spray) ginkgo, stands in front of the Founder's Hall at the Nishi Hongwanji Temple in Kyoto. Its age is estimated to be 400 to 500 years old. A legend tells that when the fire that swept through Kyoto in 788 threatened



Nigatake ginkgo at Ichou Machi, Sendai City, Miyagi Prefecture.

When the Mizufuki ginkgo showed signs of decline, a Kyoto tree doctor, Shoji Yamada, was called in to restore its vigor. First, he studied the tree externally and found spreading trunk rot and hollowing. Next, to investigate the soil layers and the distribution of the root system, soil excavations 4 feet deep and 3.2 feet wide were made at three locations under the tips of the canopy. This revealed that the soil was severely compacted by foot pressure to a depth of 4 to 6 inches, hampering the growth of feeder roots and causing asphyxiation. The measures taken to help the tree recover its vigor were:

1. Dead parts of the trunk and large branches were pruned to remove rot, taking care not to harm the tree's beautiful shape. Then, urethane resin was injected into the tree; putty was used to prevent rainwater from penetrating this repair work. Finally, an antibacterial agent was applied.
2. The soil beneath and around the tree was excavated to a depth of 20 inches—using great care not to damage the fine roots—then filled with new soil, a soil-improvement agent, and fertilizer.
3. A shallow embankment was formed and groundcovers planted to retain moisture in summer and prevent freezing in winter.
4. To protect the tree from soil compaction, a fence and curbstones were placed around the tree to keep people away from it.

By mid-April of the same year, fresh young buds had formed. The tree has recovered its vigor and appears to be in good condition.



TERUMITSU HORI



TERUMITSU HORI

Mizufuki ginkgo at Nishi Hongwanji Temple, Kyoto, photographed in 2000.

to spread to the Hall, this large, male ginkgo sprayed a column of water on the flames, saving the building. It is 39 feet in height with a circumference at the roots of 29 feet and a canopy of 85 feet in diameter. In 1994 the tree was losing its vigor: its branches were drying up, and the size and density of its leaves were dwindling. Fortunately, treatment carried out at that time has restored the tree to health.

Perhaps the most famous ginkgo stands in Hiroshima. When the atomic bomb was dropped on that city on August 6, 1945, some of the trees in the temple called Housenbou survived the atomic blast, although it was only one kilometer from its center. One of these survivors was a ginkgo tree that stands near the main building of the temple. The building was instantly destroyed but the ginkgo survived; fresh young buds appeared soon afterward, and new branches formed.

The temple's followers were eager to rebuild the main building, but the ginkgo tree presented a problem. There was no room for it elsewhere on the temple grounds, and in any case, it would have been risky to move such a large tree, estimated to be 150 years old. Rather than cut it down, the building was modified to preserve the tree where it stood. The roof was changed to give the tree more space, and two stairways were built in the front of the building to form an inverted "U" with the ginkgo protected inside it. An opening under the stone stairs allows air to flow past the tree. This accommodation expresses the intense feelings that this ginkgo



TAKETO NAKANO

A Hiroshima survivor stands before the Housenbou Temple, Hiroshima City.

tree inspires, still living today, a precious witness to the disaster. It has a powerful impact on all who see it.

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Ginkgo biloba and shrine in China, the village of Leng che, Valley of the Tung River, western Sichuan. Measured at eighty feet in height and twenty-five in circumference and photographed by E. H. Wilson, 1 August 1908.

Arnold Arboretum Weather Station Data — 2000

	Avg. Max. Temp. (°F)	Avg. Min. Temp. (°F)	Avg. Temp. (°F)	Max. Temp. (°F)	Min. Temp. (°F)	Precipi- tation (in.)	Snow- fall (in.)
JAN	36	17	27	65	-2	3.87	16.2
FEB	43	22	33	66	0	3.35	8.85
MAR	54	33	44	78	14	4.49	3
APRIL	57	38	48	78	24	6.88	0
MAY	72	48	60	97	35	3.16	0
JUNE	82	56	69	96	44	6.67	0
JULY	84	62	73	93	52	4.91	0
AUG	83	61	72	96	50	1.78	0
SEPT	77	52	65	93	32	4.52	0
OCT	66	43	55	84	32	3.54	0
NOV	47	34	41	66	12	4.87	0
DEC	37	18	27	66	5	5.73	0

Average Maximum Temperature	62°
Average Minimum Temperature	40°
Average Temperature	51°
Total Precipitation	53.77 inches
Total Snowfall	28.05 inches
Warmest Temperature	97° on May 8
Coldest Temperature	-2° on January 17
Date of Last Spring Frost	28° on April 15
Date of First Fall Frost	32° on September 29
Growing Season	167 days

Note: According to state climatologist R. Lautzenheiser, the year 2000 was abnormally cold and wet; compared to 1999, it was 2.2 degrees colder and more than 5 inches wetter. February, March, and April were very mild—March 2000 was one of the warmest on record—but this was offset by the unusually wet and cool June and July. June ranked eleventh for precipitation in 130 years. September through December were also below normal in temperature; the first killing frost arrived on September 29. Snowfall totaled only 28.05 inches, 13.5 inches below normal.

The consistent rains through spring, summer, and fall made 2000 a very good planting year. Trees and shrubs put on more than average growth and appeared to be recovering well from the droughts of a few years ago.

ARCHIVES OF THE ARNOLD ARBORETUM



Tree climbing in the Arnold Arboretum, 1949. Heman Howard photographed arborist William Stefany near the top of a white pine.

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